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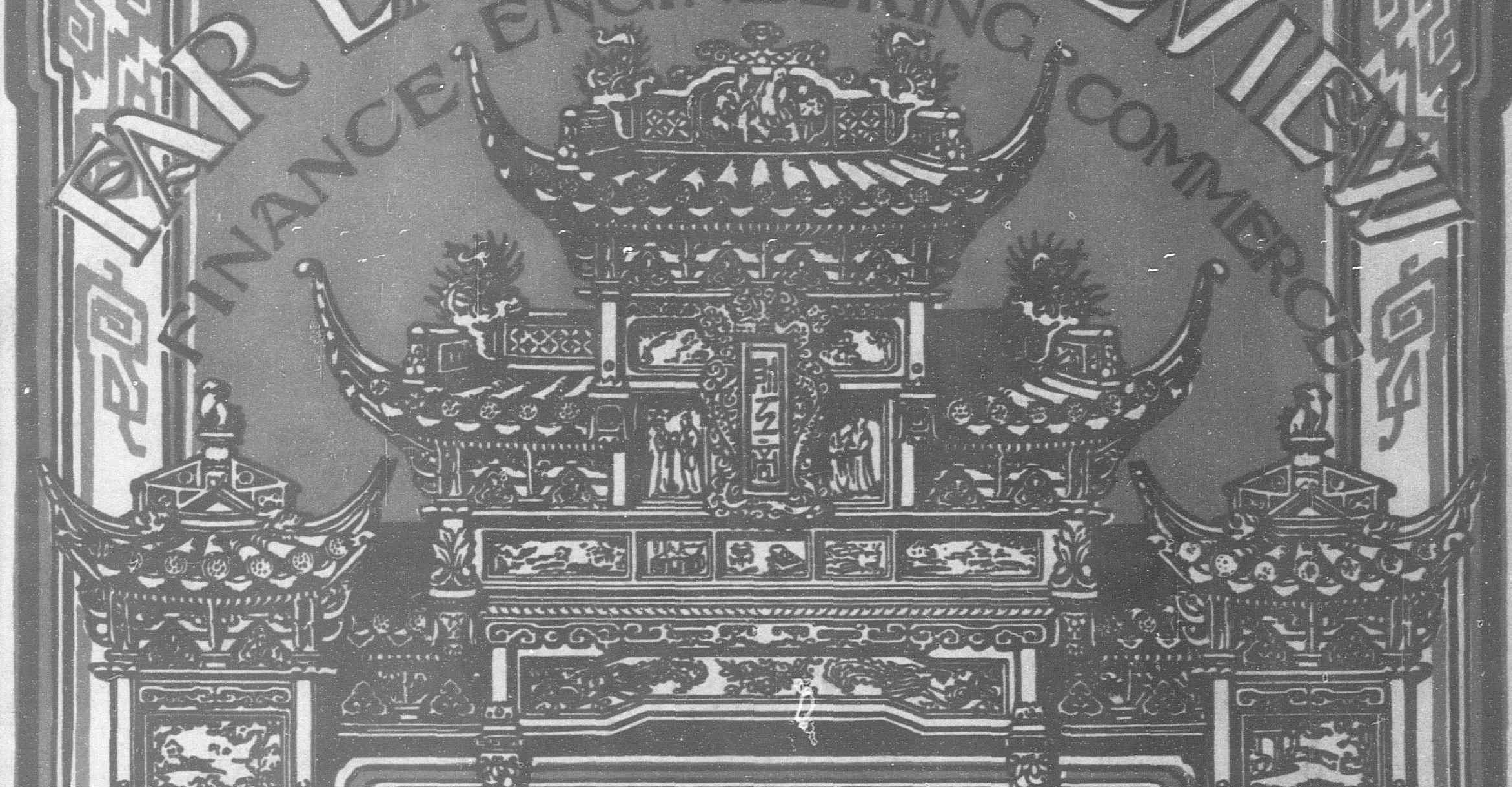

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MANCHURIA

By GEORGE BRONSON REA

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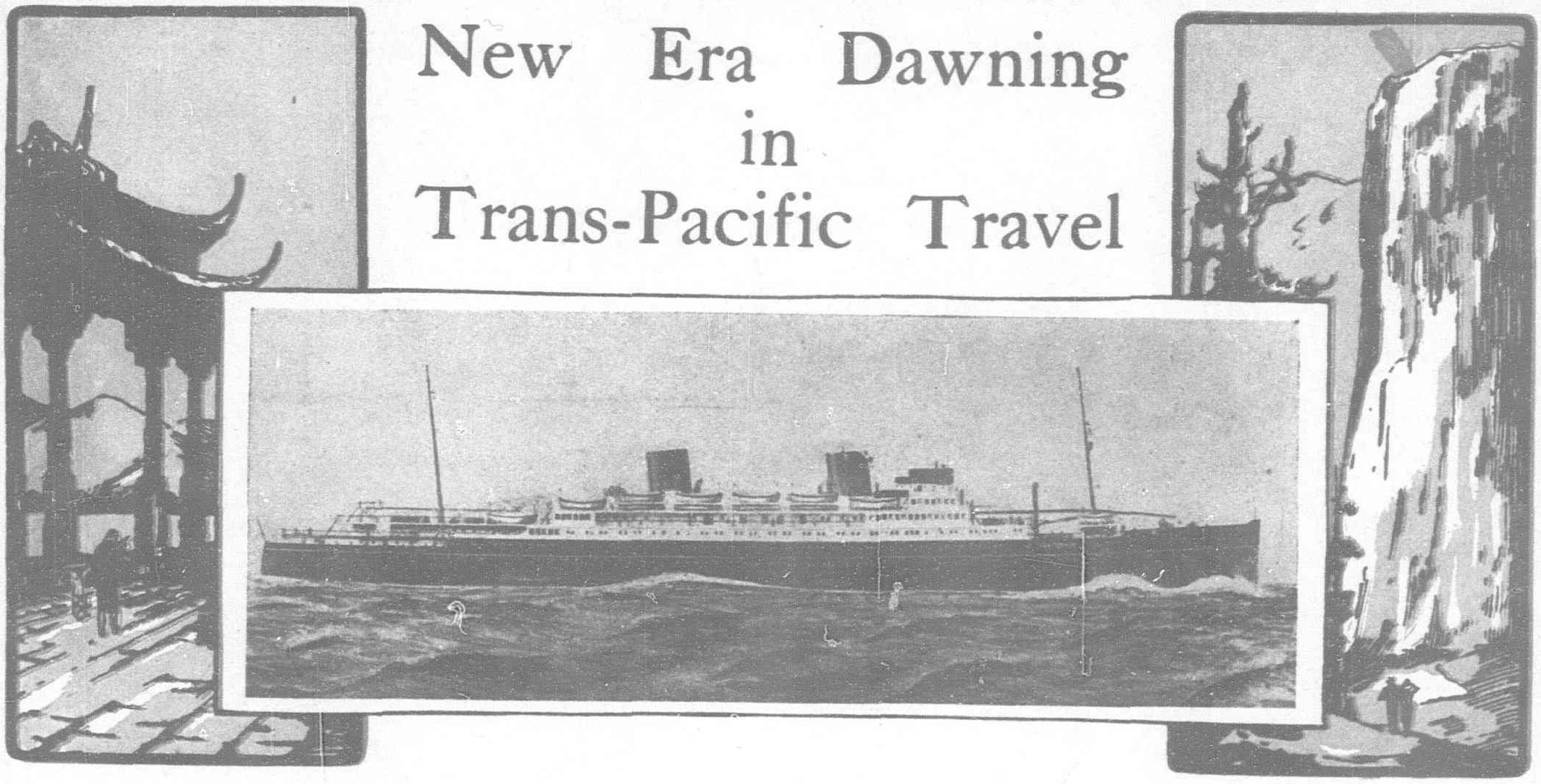
Vol. XXV

February, 1929

No. 2

New Era Dawning in Trans-Pacific Travel



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The Far Eastern Review

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Rehabilitation—China's First Political Problem

By George E. Sokolsky

MOST Chinese and many foreigners insist that little can be accomplished for the stabilization of China until the country has been unified under a single, powerful, Central Government. The general political tendency of the national Government in Nanking is to fight every evidence of regionalism even to the extent of attempting to stamp out provincial identities. Regionalism is regarded as a disease, a curse which the militaristic feudal period has left as a legacy of evil.

Yet, the fact remains, that the enormous continent of China resists such unification; every political tendency is towards decentralization, towards that very regionalism which the Kuomintang attacks most savagely. The size of the country, the varying characteristics of the people, the differences in speech—all these foster regionalism. But infinitely more important is the broken-down physical basis of Chinese economy, the debilitated railways, the lack of highways, the absence of airways and the fast silting-up waterways. These are the fundamental causes for the weakness of the country, for even if the Government were sufficiently powerful to enforce its will, even if the crops were plentiful, even if there were a well-organized industry to supply the interior with manufactured goods, the means of communication are inadequate to make for an efficient and ample distribution of forces and goods.

There are about 7,000 miles of railways in China for 4 million square miles of territory. The mileage has not increased in a decade of revolution and civil war. The rolling stock has been ruined by soldiers, the road-beds have been neglected. Mr. Sun Fo, Minister of Railways, then, has taken over the country's most difficult and most fundamental task. He has not only to rehabilitate the existing roads, but he must increase the mileage of the railways, he must develop a railway system which will connect the rising industrial centers with the agricultural areas, which must consume the goods manufactured in the large cities. Tariff autonomy, the stabilization of the currency and other fiscal reforms which Mr. T. V. Soong, Minister of Finance, plans to make effective, cannot serve China unless simultaneously, the means of communication are so increased and improved as to modernize the physical basis of life in China. For instance, it is to be presumed that tariff autonomy will result in an increase of factories and mills engaged in the manufacture of goods which were heretofore imported from foreign countries. China can neither make the fullest use of her raw materials or of her manufactured goods as long as inadequate communications prevent a free and rapid interchange of commodities.

It would appear that one of the initial errors in organization is the division of the means of communication into at least two ministries for political reasons. There should be one ministry in charge of ways—railways, highways, waterways and airways, so that a single, co-ordinated scheme might be worked out for the rehabilitation and improvement of all means of communication at the same time. For instance, an airway might connect two railways; roads should be constructed as feeders to railways and rivers; waterways should be improved according to the traffic they are to bear. In a word, the means of communications should be created to utilize all agencies to their greatest efficiency for the development of the commerce of the country. The communications problem is economic, not political. Upon it depends the movement of China from a ricksha to an aircraft culture.

It is often suggested that it is impossible for financiers to invest their capital in China because of the lack of security, but, on the other hand, unless the railroads of the country are developed, there will never be security. The problem, then, is to work on a formula which will bring to the financiers that security which they seek and which will, at the same time, provide China with the railways that are essential to her future developments. Mr. Sun Fo is apparently working along those lines and he will have the

(Continued on page 55).

Sun Fo, Minister of Railways

The Will to Sino-Japanese Amity

By George E. Sokolsky

THE present impasse between China and Japan is a menace to the peace of the Pacific. These two nations must not be permitted to drift into a condition of permanent embitterment. If there is a genuine will to peace and understanding, a formula can be found by men of the talent and ability of Dr. C. T. Wang and Mr. Yoshizawa. The petty details, the fine points of diplomacy, the insistence upon precedence and precedents should not impede the conclusion of a new agreement and the ushering in of a new era of Sino-Japanese Amity. But there must be a *will* to peace ; there must be a decision that peace should prevail.

The Tsinan Affair has bitten into the psychology of both nations more deeply than appears on the surface. Just as in China there is undoubtedly a powerful anti-Japanese Movement, so in Japan, there is an anti-Chinese movement, patent and forceful. When I visited Japan in the autumn, I noticed this tendency of Japanese public opinion, but when I described it in China, the Chinese refused to believe that Japanese public opinion demanded a stronger policy than the Government chose to take. In both countries, the Government would make compromises, but the populace demands extreme measures, which neither of the negotiators can obtain and which neither country can, with decency, impose. In both countries, the negotiators are constantly being attacked for their weakness and their concession ; yet neither of the negotiators has been able to discover a formula which will bring an understanding with honor and fairness and yet satisfy public opinion at home.

The formula of "mutual regrets for lives lost and mutual reparations for damages done" is so broad that apparently each side seeks for a very much more specific statement and it is over the details of this specific statement and the form in which it is to be presented to the world that, after an all-night session and a hopeful outcome, the conference between Dr. Wang and Mr. Yoshizawa ended in failure.

Baron Tanaka, at the opening of the Japanese Diet, commenting on the foreign relations of his country said as regards China :

"Turning now to the situation in China, it is highly gratifying for this Empire which always has at heart the welfare of the Chinese people to note that the strife and warfare which have been prevalent in China for more than fifteen long years are gradually subsiding and everything now appears to point to peace. This Government are sincerely desirous that the Chinese nation, availing itself of this happy tendency in its affairs, may speedily be enabled to accomplish its great enterprise of peaceful unification. Deeply sympathizing as they do with the Chinese people, this Government are quite willing, in co-operation with the other nations having close relations with China, to lend them assistance as far as possible in their task of construction. It need hardly be pointed out that, the path of China both at home and abroad being beset with difficulties, the Chinese Government, in order to attain their aims, should more than ever be guided by the counsel of self-restraint and moderation.

"In speaking of our relationship with China, I feel bound to say a few words about our position in Manchuria as distinguished from the rest of China. In view of the political and strategic importance which it bears to Japan on account of its geographic contiguity with our territory and considering the historic significance which it possesses in that the region was restored to China by Japan at the risk of her national existence from the aggressive grip of Tsarist Russia, it is quite natural that the sentiment of the Japanese people toward Manchuria should be peculiarly keen and entirely different from that toward any other part of China. Furthermore, more than a million Japanese subjects reside in the region to-day and Japan has many important rights and interests there. The interest and concern with which the Japanese people have come to regard the affairs of Manchuria should therefore not cause the least wonder. It goes without saying that the Japanese Government, will respect the sovereignty of China over Manchuria, do all in their power for the preservation of the principles of the open door and equal opportunity and desire that the region be made a safe abode for both natives and foreigners. They are, at the same time, fully determined to take appropriate steps when a state of affairs arise in Manchuria which shall disturb the local tranquillity and thus put their vital interests in jeopardy. This Government have always followed this policy in all their dealings with Manchuria.

"In a word, what this Government desire in regard to China is that the two nations, mutually understanding the position of the other, should be animated by the spirit of conciliation in their exchange of views and in their efforts for the settlement of the various questions pending between them, so that a relationship may be restored between them that will really not only contribute to their mutual well-being but will be conducive to the tranquillity of the Far East and eventually to the progress of the world civilization."

The statement must be taken at its face value. Baron Tanaka offers the friendship of Japan to the Chinese people, but he asks for guarantees of protection for the lives and properties of Japanese subjects in China generally and in Manchuria in particular. How to make this friendship effective is, of course, the question of the day. How to carry a desire into a reality ? How to bring the two nations together, so that they will not view each other with suspicion and distrust ?

It would appear that the Tsinan Incident is at the moment the crux of the situation. If a solution can be found then there is hope that an atmosphere will be engendered favorable to a consideration of other problems. If not, then the relations will continue as they are, the Chinese conducting a world-wide propaganda against Japan, boycotting Japanese goods and teaching their people to hate the Japanese. In Japan, on the other hand, hatred, bitterness, resentment will continue to strengthen popular antagonism to China and to make it increasingly more difficult for any Government to concede anything at all to Chinese public opinion. Such a situation cannot make for the peace of the world or for an optimistic outlook for the future of China.

For, no matter how one views this problem, it is necessary for China to obtain capital abroad for the development of industry, means of communication and the stabilization of the Government. And such capital cannot come here, if there is any possibility at all that there may be a continuation of disorder. The Tsinan situation, in its present state, affords ample possibilities of being a source of continued disorder, for boycotts and agitation leads inevitably to popular excitation of a nature unsuitable to the needs of a nation seeking stabilization.

Nor is it to the interest of Japan that there should be continued chaos in China. Only fools and propagandists, who cannot see the woods for the trees, can assume that Japan can thrive best on a chaotic China. Japanese statesmen are sincere when they insist that they seek an orderly and stabilized China, *for it is obviously to their interests that China should be orderly and stabilized.* Such conditions will make for trade and for the general peace of Asia—Japan needs both.

Who can find the formula to peace ? Dr. C. T. Wang and Mr. Yoshizawa have a wonderful opportunity before them. Will they serve both countries by finding the irreducible minimum which both countries can accept and the broadest maximum which both countries can concede and incroporate them into a treaty of amity and co-operation.

Japan's China Trade in 1928:

Effects of the Anti-Japanese Boycott

By Moriyoshi Taba

THE specific features of the present anti-Japanese boycott campaign may be summarized in substance as follows :—

(1) The present anti-Japanese boycott is confessedly employed by the National Government of China as the diplomatic weapon.

(2) The Left Wing of the Kuomintang played off the anti-Japanese boycott against the Right Wing now in power at Nanking. In other words, the Left Wing, jingoistic in its attitude towards Japan, designed to drive the National Government to resort to the "push and go" policy, expecting at any moment to fish in the troubled waters thus stirred up.

(3) Some Chinese merchants mostly engaged in *cotton* spinning industries and shipping business took advantage of the boycott in order to outrival the Japanese competitors in their respective line of business.

(4) The routine business of the gang of boycotters was to seize in broad daylight Japanese goods sold to Chinese merchants with the object of exacting the so-called "patriotic fund" from the traders. This was openly carried out with impunity, so that they exercised an *imperium in imperio* either in utter defiance of, or as is generally believed, in concert with the National Government. Therefore, it hardly need be said that the strongest protests lodged by the Japanese Authorities are of little avail.

(5) The methods of the boycott movement became so organic and tactful that the boycott has been carried out in the "slow but sure" way on the united front all over the nation and the South Seas, except Manchuria.

Increase of Japan's Exports

So much for the general aspects of the present boycott. Now we have to turn to another angle, *viz.,* economic consequences. Although well convinced of the grave nature of the boycott viewed from the political as well as social standpoints, we are not so pessimistic regarding the economic effects of the boycott on Japan's China trade.

To get the bird's-eye view of Japan's China trade, import and export, in 1928, as compared with the preceding two years, we give the following trade returns in Y.1,000 arranged monthly by the Japanese Finance Office :—

	Exports (Incl. Kwantung)			Imports (Incl. Kwantung)		
	1928	1927	1926	1928	1927	1926
January	32,597	31,384	41,482	42,771	34,494	41,178
Feburary	40,667	29,055	48,501	33,792	30,622	42,634
March	47,340	32,987	56,673	40,481	38,199	36,972
April	43,869	30,365	49,989	38,594	34,332	37,621
May	44,574	36,973	45,647	44,588	37,608	40,824
June	33,560	40,844	39,393	29,740	35,629	36,529
July	37,831	35,588	41,433	19,712	21,644	31,381
August	43,350	41,552	44,019	18,600	16,142	21,201
September	43,646	37,329	44,714	20,952	19,131	21,695
October	47,022	41,068	43,222	30,530	26,264	23,397
November .. .	34,587	38,314	38,741	31,157	30,080	29,011
December	34,289	33,995	27,655	34,070	34,339	33,912
Total	483,332	429,454	531,469	384,987	358,484	396,355

We can understand from the above analysis that Japan's China trade in 1928 amounted to the total value of Y.868,319,000, composed of Y.384,987,000 for imports and Y.483,332,000 for exports, recording an export excess by the sum of Y.98,345,000. In an export trade which is generally believed to have been given a *coup de grace*, the total value amounted to Y.483,332,000 in 1928 as against Y.429,454,000 in 1927 and Y.521,469,000 in 1926 respectively. Taken as a whole, the export figures of 1928 are favorable as compared with those of 1927 with the exceptions of the June and November figures. This increase continued even after the Tsinan Incident in May, although it should be admitted that the 1928 figures can hardly bear comparison with the 1926 figures.

Considering the export trade situation in 1928 as compared with that in 1927 from another angle, namely, destinations of exports, we arrive at the similar conclusion—a general advance of export trade figures in 1928 as compared with the 1927 figures, with exceptions of the figures for North China and South China.

The import and export trade figures in 1928 as compared with those of the two preceding years arranged by destinations read as follows in Y.1,000 :—

	Exports			Imports		
	1928	1927	1926	1928	1927	1926
Manchuria	65,422	51,732	65,703	58,656	41,091	32,058
N. China	97,145	98,756	96,268	60,522	67,736	64,606
C. China	180,691	149,971	213,782	83,980	63,755	90,857
S. China	1,420	5,015	20,749	9,723	6,823	7,146
Kwantung	99,101	82,039	92,403	137,439	125,264	146,170
Total	443,779	387,513	488,905	350,320	304,669	340,837
Hongkong	52,573	61,913	45,745	1,090	1,487	1,258

N.B.—The above figures are for eleven months ending on November 30.

It is indicated that Japan's exports to Manchuria, Kwantung Province and Central China showed a remarkable advance, while those to South China marked a considerable decline, accompanied by a slight decrease to North China. This situation indicates that the boycott movement was most vigorously supported in South China. Japan's exports to Hongkong, which is a liaison port between Japan and South China as well as the South Seas, also declined in 1928 by the considerable sum of Y.9,340,000, as compared with those of the preceding years, recording Y.52,573,000 in 1928 as against Y.61,913,000 in 1927 and Y.45,745,000 in 1926 respectively.

The staple goods exported to China including Kwantung Province in 1928 as compared with those of the preceding two years are estimated in Y.1,000 as follows :—

Cotton tissues :	1928	1927	1926
January-April	64,354	38,266	81,213
Whole year	173,572	136,344	195,655
May-December ..	109,218	98,078	114,442
Sugar :			
January-April	13,744	7,800	7,902
Whole year	35,330	27,078	33,241
May-December ..	21,586	19,278	25,339
Paper :			
January-April	6,280	5,172	5,167
Whole year	19,732	14,473	14,631
May-December	13,452	9,301	9,464
Coal :			
January-April	6,662	5,450	7,406
Whole year	19,072	19,566	23,457
May-December	12,430	14,116	16,051
Cotton yarn :			
January-April	3,131	4,504	11,241
Whole year	8,881	10,072	26,896
May-December	5,750	5,568	15,655
Machinery and parts :			
January-April	2,073	3,191	2,543
Whole year	8,888	9,627	7,416
May-December	6,815	6,436	4,873
Sea products :			
January-April	2,193	1,709	4,429
Whole year	7,970	9,651	14,489
May-December	5,777	7,942	10,060
Timber :			
January-April	1,752	1,396	1,754
Whole year	6,427	5,156	5,988
May-December	4,675	3,760	4,234
Iron manufactures :			
January-April	2,158	1,600	3,344
Whole year	5,939	5,073	6,433
May-December	3,781	3,437	3,089

According to the above analysis, we learn that almost all items of Japan's exports to China during 1928 recorded an increase to some extent, as compared with those of the preceding year, except coal and sea products. Cotton tissues headed the list as usual with an export excess in 1928 by some Y.11,140,000 as compared with the preceding year, while sugar ranked second showing an export excess by some Y.2,308,000, followed by paper which marked a favorable trade balance by some Y.5,259,000 as compared with the preceding year respectively.

The export of coal declined by some Y.1,686,000 which is rather attributed to the margin of prices of the article in Japan and China than the unfavorable effects of the boycott. Sea products also showed a decline by some Y.2,165,000, owing to the boycott.

If we limit our present investigations exclusively to the general aspects regarding Japan's export trade to China in 1928, in defiance of the reverse side of the story and assume an optimistic attitude towards the unfavorable effects of the boycott with our eyes fixed only on the sunny side of the export trade situation, we can hardly escape censure against our optimism and shallow observations of the boycott movement. We must, therefore, see the other side of the shield, inquiring into the local situation of the boycott.

First of all, we are convinced that it may not be appropriate to deal with the boycott situation, comparing only the export trade figures of 1928 with those of 1927 when Japan's export trade was killed, owing to the civil disturbance of China and the anti-Japanese boycott which broke out stimulated by the sending of the Japanese troops to Shantung in June of the same year.

In the second place, it should be pointed out that during last summer when the boycott movement reached its climax, warehouses of most Japanese shipping firms, especially in Shanghai, were filled with varieties of idle stocks unparalleled in volume these few years past.

Third, it should be taken into consideration that Japan's exports to China in 1928 would have been greatly advanced in the light of the comparatively small exports in the preceding year, had it not been for the boycott.

Fourth, it is propagated that certain commodities made in Japan have been replaced in the China markets by similar goods imported from foreign countries.

Frankly speaking, Japan's export trade to North and South China suffered a heavy loss mainly due to the civil disturbance and the boycott, while in Shanghai and the Yangtze ports, transactions in commodities were very far from satisfactory mainly due to the boycott, in spite of an increased gross import of Japanese goods in 1928 as compared with the preceding year.

For instance, in Shanghai, the distributing and consuming centre of mass commodities, the boycott torture was most severely carried out, affecting a serious blow to Japanese commodities. According to the investigation of the Shanghai Japanese Chamber of Commerce and Industry, which has already been made public in the *Japan Chronicle*, the following summarizes the situation :—

"During the five months ended November 30, cotton cloth imported from Japan totalled 10,154,517 pieces, as compared with 11,838,132 for the same period of 1927, or a loss of 15 per cent. English cloths imported totalled 2,452,455 pieces, an increase of 75 per cent. over the corresponding period of the previous year. The United States shipped 33,003 pieces or 390 per cent. more, and Germany 63,736 pieces, 480 per cent. more.

Woollen, union and artificial silk goods fell as low as to 93,119 yards last year, as against 920,711 yards for the same period of the previous year, namely a loss of 990 per cent. while English goods were up by 287 per cent. and German by 340 per cent.

Sugar was practically shut out last year, 15,894 piculs compared with 592,709 piculs, a loss of 97 per cent. Hongkong sugar was 202,207 piculs as compared with 221,224 for the same period of the previous year, but Java shipments increased about 30 per cent. to 2,309,015 piculs, as compared with 1,776,477, and Singapore 48 per cent. to 49,396 piculs compared with 33,269 for the corresponding period of last year.

Printing paper increased 290 per cent. to 110,393 piculs, as compared with 39,643, the increase being caused by purchases in view of potential demand. But the total of the material imported from other sources is reported as 252,032 piculs, as against 132,453 for the same period of the previous year, 83 per cent. increase. Other classes of paper from Japan lost 20 per cent., but an increase of 10 per cent. is noted in shipments from other markets.

Maritime products lost about 70 per cent., at 83,300 piculs, compared with 258,734, with rival goods 30 per cent. less at 232,643 piculs compared with 304,022.

Heavy chemicals fared differently, for Japan's shipments totalled 62,424 piculs against 57,800 for the same period of the previous year, while similar goods from other sources were about 30 per cent. down.

Wood and timber account for 16,056,000 super feet against 11,056,000, about 29 per cent. increase compared with about 60 per cent. increase for other countries.

Metals were 57,895 piculs compared with 55,728 for the corresponding period of the previous year, about 8 per cent. increase, the United States being up by 270 per cent. and Germany 350 per cent.

The total value of Japanese machinery imported was Tls.354,959, a rise of 18 per cent., but an increase of 59 per cent. is noted in other countries with a total of Tls. 2,830,000.

Aniline dyes lost about 50 per cent. with a total of Tls. 15,461 against over Tls. 24,000. Other Japanese dyes were down by 20 per cent., while rival goods gained 79 per cent.

Coal is reported as 386,830 tons against 454,445 for the corresponding period of the previous year, a loss of 15 per cent. with an increase of 2 per cent. noted in consignments from other markets with a total of 905,000 tons against 885,000 for the previous period."

In Tientsin, the great distributing centre in North China, the boycott was also staged on a grand scale, damaging Japanese commodities imported. For instance, cotton tissues were dealt a hard blow. The total volume of the Japanese cotton tissues imported into Tientisn during the October-December quarter, 1928, was 40,371 pieces, as compared with 62,040 pieces in the same quarter of the previous year, while cotton yarn totalled only 745 pieces during the same quarter in 1928, as compared with 14,666 pieces in the corresponding quarter in 1927.

In Hankow, the Chicago of China, the boycott movement presented itself most vigorous towards the fall of the year when the Japanese general piece goods suffered the hardest blow. However, it is noteworthy that such staple goods as cotton tissues, sugar and coal were comparatively in good demand some time, though these goods, it was so regarded, would have fared well, had it not been for the boycott. The import of the Japanese cotton goods in 1928 increased to 48,000 packages as compared with 44,000 in 1927 and 60,000 in 1926 respectively.

The import of Japanese sugar amounted to some 700,000 piculs from January to September in 1928 as compared with some 400,000 piculs during the same quarter in 1927 with a considerable gain of some 650,000 piculs over Hongkong sugar in 1928.

On the whole, it need not say that there was an ebb and flow of business tide even during the boycott in North and Central China.

Stocked Goods Situation

Furthermore, the apparently favorable trade situation in 1928, cannot be taken at its face value. We faced the question regarding the over-stock, slow movement of goods and the breach of contract on the part of the Chinese for the transaction.

For instance, in Shanghai, the stocked volume of cotton tissues during the April-December quarter, 1928, as compared with that of the corresponding period of the previous year in pieces was analyzed by the local Japanese Chamber of Commerce and Industry as follows :—

	1928	1927		1928	1927
April ..	539,000	625,000	September ..	834,000	420,000
May ..	654,000	547,000	October ..	886,000	487,000
June ..	773,000	377,000	November ..	962,000	435,000
July ..	887,000	458,000	December ..	830,000	369,000
August ..	806,000	680,000			

The stocked volume of refined sugar in 1928, as compared with the preceding two years is as follows in 1,000 bags :—

	1928	1927	1926		1928	1927	1926
January ..	49	219	85	July ..	128	141	65
February ..	37	265	137	August ..	105	152	77
March	58	187	81	September ..	105	126	138
April	23	137	93	October ..	84	135	191
May	133	128	104	November ..	unknown	105	253
June	128	95	45	December ..	do	67	117

The above tables suffice to show the growing volume of idle goods stocked in Shanghai.

While, on the other hand, it should not be overlooked that (1) the accumulation of the stocked goods was partly due to the gradually increased volume of imports from Japan as partly due to the slow movement or the standstill of commodities on account of the boycott barriers ; (2) over-stocked goods gradually decreased in volume due to the heavy dearth of the necessaries and demand of the same in the interior ; (3) through transportation of commodities between Japanese ports and the upper Yangtze ports was opened ; (4) transhipment of certain varieties of Japanese goods for the Southern ports was made at Shanghai ; and (5) some kinds of necessaries of the Japanese manufacture threaded their way to the Chinese consumers despite the subversive activities of the anti-Japanese boycotters.

On the part of the Chinese merchants, we are reliably informed that most of them closely interested in Japanese commodities suffered a severe blow losing good business opportunities owing to the boycott.

In short, Japan's China trade in 1928 showed, betraying general expectations, rather favorable result, especially in exports at large, although it should be admitted that exports to South and North China and imports from Hongkong declined more or less, as compared with the 1927 trade. It is noticeable that Japan's China trade in 1928, with all dampening factors, was not far behind the 1926 trade which was regarded as normal, recording the advanced situation over the 1927 trade at large.

Can There Be a Free Press in China?

THE *North China Star*, since its inception, a decade ago, has been pro-Chinese to such an extent that those foreigners who have been doubtful of China's course have viewed this American newspaper as prejudiced in China's favor. The present writer was associated with Dr. Charles James Fox in the organization of this, the first American-owned and edited newspaper in North China. He knows from personal experience and from observation that it has ever been Dr. Fox's policy to support the national aspirations of the Chinese people, even when such aspirations seriously affected the interests and property of foreigners in China. It is particularly interesting, then, that this newspaper should have suffered at the hands of the National Government.

Dr. Fox's statement of the case follows in an editorial entitled, " An Arbitrary Act : "

> The *Star*, yesterday, received the following communication:
>
> No. 30527
> General
> POSTAL COMMISSIONER'S OFFICE,
> POST OFFICE
> Tientsin, 5th February, 1929.
>
> To The Editor,
> *North China Star*,
> Tientsin.
>
> Dear Sir,
>
> I have to inform you that instructions have been received from the Directorate General of Posts that, in accordance with orders received from the Ministry of Communications, your newspaper is to be refused postal transmission. In accordance with these instructions the Post Office will be unable to accept your papers.
>
> Yours faithfully,
> (Sgd.) G. E. OSLAND HILL,
> *Postal Commissioner.*
>
> This is the first and only official intimation the *Star* has received, indicating that the Nationalist Government, which this paper has always supported, had any complaint to make regarding the *Star*. We have been given no other notice and no hearing whatsoever.
>
> American law like the law of Britain and nearly all other Western countries, provides specific remedies, and specific procedure, for any infraction of the rather stringent statutes regulating newspaper publications. In America and Great Britain particularly, where the liberty of the press is one of the fundamental principles of a free government abuses by the press of this liberty are severely punished by both civil and criminal actions at law. The American, British and other foreign officials, of the countries still enjoying extraterritoriality in China, are always ready to give a fair hearing and adequate remedy to any Chinese or others who have a grievance against a foreign language publication.
>
> We have on numerous occasions declared our belief that the foreign language press in China owes an alien allegiance to the government of the country in which the publications appear, and we have always striven to live up to this principle. Had any officials of the Nationalist Government informed us of exceptions taken to articles appearing in the *Star*, we should have promptly and willingly published denials, corrections, explanations or apologies, as it seemed to us the situation called for.
>
> In this particular instance we still remain in total ignorance of what news article or articles, or of what editorial, the Nationalist Government complains. We have always given due prominence to, and sympathetic comment on, the various achievements by the Nationalist Government, under adverse conditions that are hardly equalled by those that face any other of the larger governments of the world.
>
> We believe to-day that the great majority of the higher officials of the Nationalist Government must admit that to disbar the use of the mails to a daily newspaper, without any hearing whatsoever, and while the Editor of that paper, and the majority of its subscribers, remain in total ignorance of any cause of complaint, is a highly arbitrary act, unworthy of the National Government of New China.

This is not the first instance of such stupidity. During the summer of 1927, the *North-China Daily News*, the leading British newspaper in China, published a bit of war news, which may have been in error. At any rate, when the Nationalist military authorities asserted that the news was incorrect, a retraction was published. Nevertheless, the mails were closed to this newspaper for some time —clearly not because of the trifling news item, but because exception was taken to the policy which that newspaper pursued at that time.

The vernacular press has long suffered from censorship at the hands of both the military authorities and the Kuomintang officials. This censorship has become so scandalous that often ordinary items of news are not known to newspaper reading Chinese, because arbitrary officialdom opposes publication. It is understandable that in time of war, there can be objections to such news items as may benefit the enemy, but apparently, the aim of the censorship is to prevent a free expression of opinion, to suppress criticism and to keep the people of the country in ignorance.

While the important newspapers have to submit to such gross audacity, hundreds of tabloids have come into existence which publish anything they please. The large newspaper properties dare not risk the financial possibilities of confiscation or of the destruction of the circulation, which is often larger outside the treaty ports, where police under foreign supervision can protect them. The tabloids, however, have nothing to lose. They get a printer to do their press work and if they are suppressed they start again under another name. The capital investment is small ; the responsibility is even smaller. Yet, these tabloids increase in popularity at the expense of the larger vernacular newspapers, because they publish the *news* regardless of censorship.

Another curious instance of suppression is the enforced withdrawal by the publishers of the recently published book, " Far Eastern International Relations," by Dr. H. B. Morse, undoubtedly the foremost authority on this subject, and Dr. H. G. MacNair, professor of Chicago University, who has already published several volumes on similar subjects and who is undoubtedly a specialist in current Chinese affairs. It appears that exception has been taken to the description of this volume of events which took place in 1925 and which are attributed to Communist influences. Yet, the Kuomintang itself has fully described and repudiated this same Communist influence and no historian can ignore either the influence or the repudiation. General Chiang Kai-shek in speeches and documents has described the Communist terror, and has denounced it and the Kuomintang has conducted party purification campaigns to cleanse the Nationalist Movement of Communists and their allies. Why, then, this sham and stupidity ? One need not quote Kuomintang leaders to prove the Communist control of the party from 1924 to 1927.

G. E. S.

China's New Ministers Abroad

DR. C. T. WANG, the Minister of Foreign Affairs has announced the appointment of a number of new Chinese ministers abroad, who are particularly interesting, because they represent in many respects a new type of personality—the product of the Chinese Revolution.

Dr. C. C. Wu, the new Minister to Washington was the first Minister of Foreign Affairs of the Nanking Government. He is the son of the famous Wu Ting-fang, the revolutionary leader, who brought to the service of China a deep understanding of humanity and a keen sense of humor, which gained for him an international reputation. The son is no less known than the father had been. A graduate of a high school in Atlantic City, he knows America and American ways. After returning to his own country, he fitted himself for participation in the affairs of China, so that of him it cannot be said that he does not know the language and literature of his own people. In fact it has often been surprising to younger men in the Ministry of Foreign Affairs that one who has been abroad so much and is so thoroughly steeped in foreign culture, can write Chinese with such literary finesse.

Dr. Wu is more placid in temperament than his predecessor in the Ministry of Foreign Affairs, Mr. Eugene Chen or its present incumbent, Dr. C. T. Wang, but he has a fine, if occasionally, a biting sense of humor which makes him a delightful after-dinner speaker. There can be little doubt of Dr. Wu's success in the United States.

Dr. C. C. Wu, Chinese Minister to Washington

The appointment of Dr. Wu to Washington was accompanied by the transfer of Mr. Alfred Sze Sao-ke to London. It is understood that Mr. Sze will return to China in the near future. Although he has made a splendid record for himself as Chinese Minister to Washington during a most trying period in his nation's history, he has been out of China for many years and is not personally familiar with some of the new leaders who have assumed office in recent years. He will find a country that is considerably changed in its atmosphere. Mr. Sze is very popular in England where he served as Chinese Minister for a number of years. He will also be expected to participate in the League of Nations as Chinese representative, a work with which he is thoroughly familiar.

The Minister to Rome, Mr. Quo Tai-chi is always a popular personality. Although this will be his first post abroad, except as a Member of the Delegation to the Versailles Conference, he has a large number of friends among foreigners, who are interested in China and who have known him during these many years when he acted as secretary to President Li Yuan-hung, as the friend and often emissary of Dr. Sun Yat-sen, and as Commissioner of Foreign Affairs in Shanghai and Vice-Minister of Foreign Affairs at Nanking. Mr. Quo is a typical Kuomintang member. Since he returned to China from the United States, where he studied at the University of Pennsylvania, he has always been associated with the Kuomintang. He has lived through the period of revolution as an uncompromising member of the party which now controls the Government. He will therefore be able to contribute abroad a better knowledge of the affairs of China as it is to-day.

Mr. Foo Ping-hsiang, who has been appointed Minister to Belgium was a protégé of Dr. Wu Ting Fang, and he and Dr. C. C. Wu married sisters. Mr. Foo has been Commissioner of Foreign Affairs in Canton and more recently has served as Chairman of the Foreign Relations Committee of the Legislative Yuan of the Nationalist Government. Mr. Foo is also a product of the Revolution, young, energetic, and a brilliant conversationalist, like Mr. Quo Tai-chi, he is an intimate friend of Dr. C. C. Wu.

Mr. King Wen-sz, who is to be Minister to Holland, has been Commissioner of Foreign Affairs at Shanghai. He has participated in many of the recent negotiations and is spoken of by Foreign Consuls, who have had to do business with him, as one of the most competent officials ever to have held this very difficult position.

Mr. Chu Chang-nien, who has been appointed Minister to Norway and Sweden, is entirely a new type of Chinese official. He was for many years a successful business man in Shanghai. Very popular with the British and American community, he left his business to assist his friend, Dr. C. T. Wang in the Ministry of Foreign Affairs. When he was appointed, there was some surprise that one who had not been specially trained in foreign affairs should be given such a high position as Councellor. He has, however, more than earned his "salt" by his very competent handling of the negotiations with Sir Miles Lampson, which culminated in the signing of the British Treaties. This, next to the Japanese negotiations, was the most difficult task facing the Ministry of Foreign Affairs and Mr. Chu's appointment is undoubtedly a reward for having done a remarkably good job. Mrs. C. N. Chu is the eldest daughter of Mr. Tong Shao-yi—a brilliant hostess, who will undoubtedly add her fine personality to the Chinese community in Europe.

Wanted: A Commercial Code

THE Sun Sun department store in Shanghai, which is now closed down because of a quarrel among shareholders and an attendant labor trouble, affords an example of the need for a code of Commercial Law in practice, so that when a business hits the rocks there is no definite, clear-cut procedure for the safeguarding of the interests of the investors. In Great Britain and the United States, under similar circumstances, shareholders would have gone into the Courts and asked that a Receiver be appointed to protect the value of the property, to pull the business out of its present tangle and to make it again a going concern. When that had been accomplished, this officer of the Court would request permission of the Court to turn the business back to its shareholders and properly elected directors, attempts are apparently being made to accomplish something of this nature in the local Shanghai Courts, but it is doubtful whether they have adequate jurisdiction. Meanwhile, there being no law governing the case, the Social Bureau of the Shanghai Municipality steps in and demands that a deposed manager, 14 departmental heads who have apparently proved themselves incompetent and 400 dismissed labourers should be reinstated. Should the Sun Sun company go under because of such interference by the Social Bureau, Chinese capital will undoubtedly seek the protection of foreign law, which, at any rate, is definite and understandable but which is not what nationalist China seeks in the present situation.

New S.M.R. Soda-Ash Industry

50,000 Ton Plant to be Erected near Dairen

THE new economic policy of the South Manchuria Railway Company is finding expression in the erection of several important industrial plants. In addition to the shale-oil distillation plant, steel mill and nitrogen enterprises, the S.M.R. is also launching this year, a soda-ash industry that is expected within a few years to free Japan from further dependence upon outside sources for this commodity. The basic material for the manufacture of soda-ash is salt, whose high cost of production in Japan has adversely affected the successful development of soda manufacture in that country.

The Kwantung Leased Territory is exceptionally favored for the production of salt. The climate is fairly dry with long summers and plenty of sunshine. In 1925, the area of the salt fields within the Leased Territory was about 15,200 acres, but it is possible to create new fields along the coast, of over 25,000 acres, producing from 600,000 to 800,000 tons of salt per annum. In 1925, the total output of salt from the Territory was 275,000 tons, out of which 205,000 tons was exported to Japan and Korea.

The present demand for soda-ash in Japan is about 120,000 tons per annum, of which only 20,000 tons are produced at home, the balance being imported (Importations of soda and soda-ash in 1927 was 110,000 tons valued at Y.6,540,000. Most of this supply came from England through Brunner, Mond & Company).

Taking advantage of lower costs of salt production in Kwantung and the possibility of creating an industry that in a few years will supply the amount of soda-ash now imported into Japan, the S.M.R. will organize a new company capitalized at Y.5,000,000 to engage in this business. All the shares are to be subscribed for by the S.M.R. and allotted to the public on application. It is understood that the S.M.R. will guarantee 5 or 5½ per cent. dividends on this capitalization for a period of ten years. The plant to be erected is to have an initial capacity of 50,000 tons, or sufficient at the outset to take care of half the present importations in Japan. Preliminary studies and investigations for the establishment of the new industry have been carried on over a period of years, not only by the Railway authorities, but by the Kwantung Government and the foremost chemical experts of Japan. The factory is to be located within the Leased Territory, either at Chinchou or near Dairen. The actual site has not yet been decided upon.

"The Outline of the Kwantung Government," an official pamphlet issued in 1926, states that "salt can be produced in the Leased Territory at such low cost that the future of the soda-ash industry seems exceptionally promising. The production cost of salt in the Kwantung Province is estimated at about 15 sen per 100 pounds, whereas it is 14 times greater in Japan proper." This would make the cost per ton about Y.3.00. On the other hand, Mr. T. Imai, superintendent of the Kwantung Industrial Office in a report on the soda-ash industry published in the *Manchuria Daily News* of June 1, 1927, gives the cost of production at 40 sen per 100 kin (132 lbs.) or Y.6.80 per ton. These figures are probably correct as another report on the Kwantung Salt Industry published in March, 1928, gives the cost of Yinchengtzu salt shipped from Port Arthur at Y.7.99 and Pulantien salt shipped through the same port, at Y.9.43.

For the last ten years the Kwantung salt industry has been undergoing considerable hardship owing to the operation of the Sino-Japanese Agreement signed in February, 1926, which provides for the export of 210,000 tons of Tsingtau salt to Japan and 100,000 tons to Korea in three years time. The dumping of this Chinese salt on the Japanese market at prices considerably lower than the cost of the Kwantung product, practically suspended operations in the latter territory. Tsingtau salt was quoted at Y.7.06 per ton against Y.7.99 and Y.9.34 for the Kwantung product and, in addition, had an advantage of 30 to 50 sen per ton in the freight rate to Japan. In order to compete, the Kwantung producers have had to combine to improve their methods all along the line and install mechanical loading and handling devices. The competition of salt from Great Britain, Germany, Spain and Egypt has also aggravated the situation for the Kwantung producers.

The present consumption of soda-ash in Japan is 120,000 tons per year and as the industries of the country expand the demand is bound to increase. There are only two soda-ash factories in Japan, one belonging to the Japan Soda Company, Ltd. and the other to the Asahi Glass Company. The former has a capacity of 12,000 tons but the high price of salt has compelled it to remain idle most of the time. The latter produces about 18,000 tons per year turning out a high class product which is largely consumed in the manufacture of glass in the company's own factories.

The materials consumed in the manufacture of one ton of soda-ash are ; 1.8 tons salt, 1.35 tons limestone, .016 ton of sulphate of ammonium : 16 ton of coke : 7 ton of coal : 20 tons of fresh water and 80 tons of sea water. The most important item is salt, and because of the high prices for this commodity ruling in Japan none of the soda-ash ventures have to date been successful. It is estimated that the soda-ash industry in Japan can be made profitable provided salt costs not more than 40 sen per 100 kin, or Y.6.80 per ton. In March, 1924, the Financial and Economic Commission of Japan passed a resolution urging the Government to subsidize the soda-ash industry by making up the difference between the above figure and the market price. The government salt monopoly fearing to create preferential treatment to one industry that might create a precendent for further subsidies, has failed to act upon this resolution. The fact that salt could be produced in Kwantung at the theoretical cost necessary to profitable soda-ash manufacture relieves the government of making concessions at home and encouraged those interested in backing the plan to establish the new industry in Kwantung. The salt producing capacity of this territory is more than sufficient for all the soda-ash requirements of Japan and even to compete with Europe for other Far Eastern markets. By reason of its inclusion in the Kwantung Preferential Tariff List, soda-ash produced in the Leased Territory, enters Japan free of duty, while imports from other countries pays Y.5.80 per ton. This perference however, is not considered sufficient if the foreign chemical combine attempts to maintain its dominant position in the trade by dumping their product on the Japanese market. To forestall this possibility, an anti-dumping law is being urged in Japan as well as a higher protective tariff as soon as the Kwantung industry reaches a point where it can supply home demand of 100,000 tons.

New Nitrogen Plant

As noted in the article on the Anshan Iron and Steel Works, the S.M.R. will erect this year a new sulphate of ammonia and nitrogen plant at Anshan, utilizing the waste gas for fuel. Although the exact information is not available as to the size of the plant and its output, the capital required will be Y.15,000,000 on which the S.M.R. will guarantee the same rate of dividend to the shareholders as in the soda-ash industry.

Rehabilitation—China's First Political Problem

(Continued from page 49)

advice of Mr. W. B. Poland, the railway expert of the Kemmerer mission, who is a man of such unusual abilities and knowledge that there can be little doubt but that he will envisage the problem as a whole and find a solution for it. The railway problem in China cannot be dealt with as a question of investing small amounts for single lines nor can it be dealt with from the standpoint of political strategy by foreign Powers. There must be a large comprehensive program which shall be financially sound and at the same time serve the best interests of the Chinese people, who, after all, will be the users of the roads. Any other method will only continue the chaos which exists at present.

BEANS

Their Relation to Manchuria's Prosperity and New Railway Construction

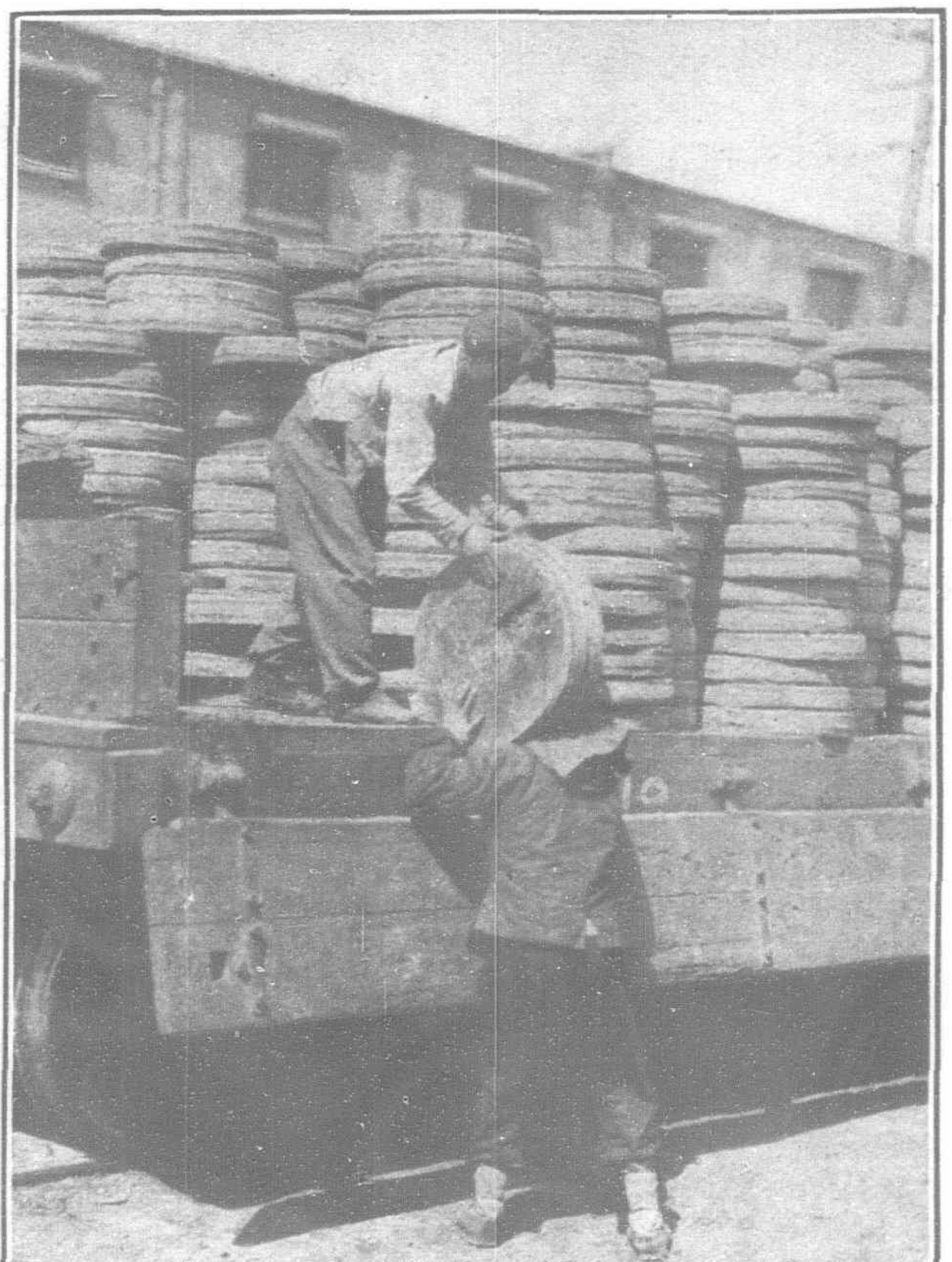
By George Bronson Rea

FOR many years, Japan has relied largely upon bean cake imported from Manchuria, as the chief fertilizing material for her rice farms. In fact, the prosperity and development of Manchuria is based upon the cultivation of the soya-bean, the extraction of its oil and the use of the residue for fertilizing and other purposes. Before the Japanese created a market in Europe for this product in 1907, Manchuria was a sparsely populated waste land with no economic outlook.

The latest trade statistics show that in 1927, of the total exports from the port of Dairen valued at Y. 217,000,000, forty per cent. consisted of beans and bean products, 41 per cent. of coal, 9 per cent. of cereals and seeds and 10 per cent. of sundries. Importations of Manchurian bean cake into Japan for 1927 were 1,176,468 tons valued at Y.88,000,000 or 30 per cent. of the total value of all the exports through the three principal ports of Dairen, Antung and Newchwang. The following figures will help to a better appreciation of what Japan's consumption of bean cake means to the general prosperity of Manchuria. The Manchurian bean crop for the last three years has averaged over 5,000,000 tons per year, valued at 450 to 500 million Mexican dollars. The disposition of the 1926 crop was approximately as follows:

Crop, North Manchuria, 3,300,000 tons; South Manchuria, 2,200,000 tons: Total Crop, 5,500,000 tons.

Export of beans	1,900,000	tons
,, ,, cake	2,250,000	,,
,, ,, oil	150,000	,,
Local consumption	242,000	,,
Local Fodder	363,000	,,
Seeding	495,000	,,
Carried over	100,000	,,
Total	5,500,000	,,



Unloading Bean Cake at Dairen

These figures show that approximately one half the total bean crop of Manchuria is passed through the local bean mills extracting about ten per cent. of the weight in oil and leaving a residue of 2,250,000 tons of cake, of which, about 60 per cent. goes to Japan. The balance of the bean cake goes to South China where it is also used as fertilizer and some to Europe and America where it is used as cattle fodder. Out of a total crop of 5,500,000 tons, about 22 per cent. or 21,200,000 tons are consumed locally while 4,300,000 tons, or 78 per cent. are exported in the shape of beans, cake and oil. Of the 2,250,000 tons of cake exported, more than half goes to Japan. The consumption of bean cake in Japan therefore represents one quarter of the total crop available for export and adds 110 to 125 million dollars to the wealth of the Manchurian farmer.

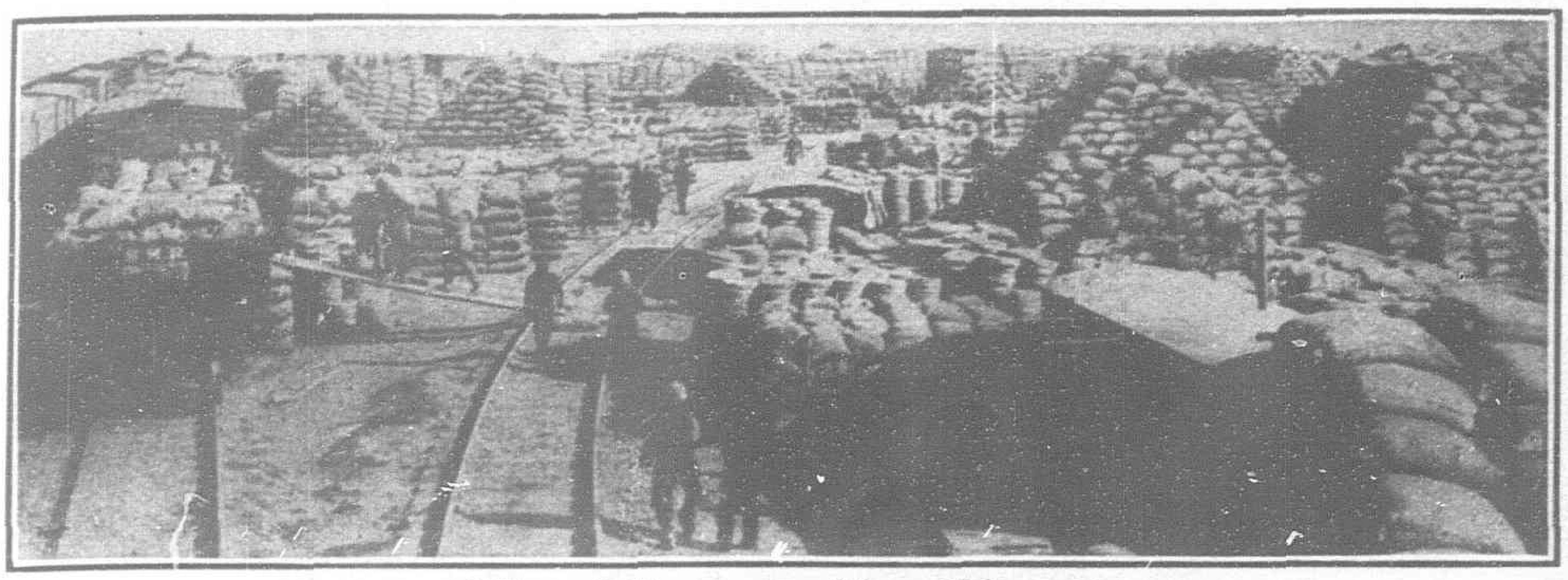
These figures prove that the prosperity of Manchuria rests firmly on a foundation of beans and coal. Now, with one exception (the Penshihu coal mines) the coal mines which furnish 41 per cent. of the exports, are owned by the South Manchurian Railway and do not contribute to the general welfare of the farming population. The bean crop and the market price of beans constitute the one source of income for the Chinese farmer and the government he supports through his taxes. Any dwindling in the export demand for bean oil and cake must react unfavorably on the general welfare of the Chinese farmers and the government of the Three Eastern Provinces.

The Chinese are reluctant to admit that Japanese initiative opened up an export market for soya-beans that has made possible the tremendous development and enrichment of North and South Manchuria during the past twenty years. In denouncing Japan for "exploiting Manchuria and attempting to annex the territory under cover of her economic necessities," the Chinese give no consideration to the operation of economic and industrial laws that may once more change the entire aspect of the Manchurian problem. They fail to realize that the prosperity of Manchuria is erected upon a foundation laid by Japanese masons and that what Japan has so carefully built up, she can just as easily demolish. For, unless all signs fail, China will soon have to find other uses and markets for her bean oil and cake or face economic ruin in Manchuria.

The handwriting is writ large upon the wall. Within the next five years, Japan will have little further use for bean cake as fertilizer. Unless new markets are found for the cake, the oil milling industry in China is doomed. Extraction of the oil alone is not enough to justify the continued operation of the mills. The tendency of the United States and other vegetable oil producing countries to protect their own industries has already adversely affected the prosperity of the oil mills in Manchuria, cutting down their profits to the vanishing point.

In fact, what was once a highly prosperous industry is now moribund, with little hope for its resuscitation. Four years ago there were 448 oil mills operating in North and South Manchuria capable of turning out over a half-million pieces of cake daily and 2,654,000 kin of oil. Many factors have contributed to the decline of this industry, the principal one being that the Chinese, in pursuit of money with which to carry on their internal wars, have deliberately killed the goose that laid the golden eggs.

The bean industry was built up by the Japanese on the natural law of supply and demand, prices being regulated entirely by prevailing markets and crop conditions. In recent years, this basic law has been set aside and the price of beans arbitrarily fixed by a group of Chinese banks and transport companies acting as agents for the Mukden, Kirin and Heilungkiang Governments. Backed by the full powers of autocratic warlords, these agents cornered the bean crop in advance, compelling the farmers to sell their produce at the price fixed by the combine and accept inconvertible paper notes in payment. This official interference with the natural laws of trade enabled the official combine to corner the crop and without regard to whether bean cake was quoted low in Japan or bean oil was cheap in Europe, to hold it for high prices. The bean

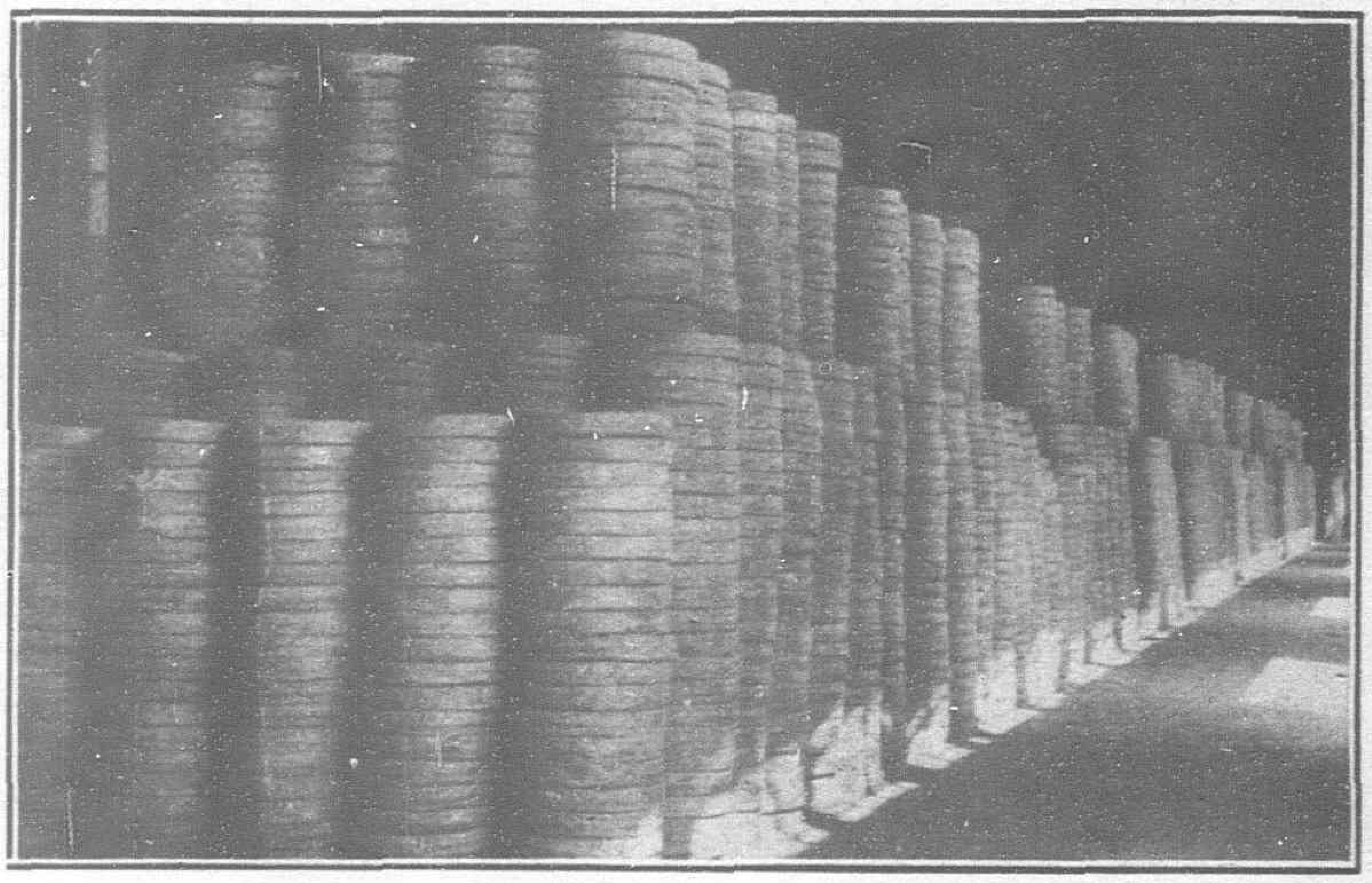


Piles of Beans Awaiting Shipment

mill owners, in order to keep their factories going, have had to buy the beans dear and sell the oil and cake cheap; in other words, to operate at a loss. The end of the road is near. They are now facing ruin.

That is only one side of the story. The other side presents an appalling picture of official rapacity and organized theft. For many consecutive years Manchuria had prospered. An era of peace, security and profitable trading under the assured protection of Japan, piled up an immense store of wealth for the Chinese farmers and merchants. Then Chang Tso-lin and his generals determined to conquer the rest of China and found a new dynasty on the ruin of the so-called republic. To do this, they needed lots of cash. There was only one place to get it; from the people. So Chang and his satraps in Kirin and Heilungkiang started the printing presses working overtime and turned out enormous quantities of paper money, even down to five cent shin plasters. The officials directing the bean monopoly forced these unsecured and irredeemable notes on the farmers in payment for their crops, under threat of imprisonment or worse. The beans so collected were stored by the government manipulators, held for high prices and sold for hard cash. In this way, Chiang Tso-lin and his Manchurian war-lords procured the money to pay for their arms and munitions and prosecute the war against the Kuomintang. They drained the Three Eastern Provinces of silver and left in its place tons of worthless paper. The average bean crop of Manchuria is worth about $500,000,000 silver. These crops are all raised by Chinese farmers who were forced to sell at prices fixed by the monopoly and accept payment in worthless paper. This system of highway robbery has been going on for the past four or five years during which over two billion dollars in worthless paper has been exchanged for the bean crop alone, not to mention other produce. With this background, we begin to have some idea of the enormous amount of irredeemable paper now circulating in Manchuria. There is no official data upon which to base even an approximate estimate of the amount issued. The Chinese authorities refuse to publish an official statement but the following estimates have been given out by responsible Japanese banking experts:

	Issued	Exchange Value in Yen
Fengpiao (Notes issued by the Mukden Government)	1,000,000,000	48,000,000
Kirin Notes	3,000,000,000	17,000,000
Heilungkiang Notes ...	2,500,000,000	7,200,000
Harbin Notes	45,000,000	35,000,000
Total	$6,545,000,000	107,200,000



Bean Cake Stored in a Dairen Warehouse

The Fengpiao is therefore worth 20 to the yen or about five cents silver; the Kirin Notes, 180 to the yen, makes their value about one half cent silver while the Heilungkiang issues quoted at 350 to the yen is so much dirty paper hardly worth its weight as junk. Allowing for exaggerations in the Japanese estimates, it is fair to assume that the Fengtien generals looted the provinces under their control of over five billions in silver in four years! No wonder Chang Tso-lin and his generals could carry on a prolonged struggle for the mastery of China; no wonder he could build railways and operate the largest arsenal in China. It cost him nothing. The looting of China Proper by other warlords was petty larceny compared with the wholesale operations of Manchuria's overlords.

However, the Fengpiao is only a side issue. This is a story about *beans*, so we return to our subject. The majority of the eighty bean mills in Dairen have been idle for a long time. Some operators have already quit the field in despair and engaged in other lines of business. It is only a question of time when the once prosperous bean-milling industry of Manchuria will be only a memory. England and Continental Europe will continue to buy soya beans in bulk if the price is right, but the extraction of the oil and by-products will be done in their own mills. The United States, at one time a heavy buyer of Manchurian beanoil, has practically ceased to be a customer. The American import tariff was raised a few years ago to protect the cotton-seed oil industry, and the farmers are again demanding legislation that will still further raise the duty on foreign vegetable oils. This will shut out the Manchurian product altogether from the American market. Let us now look at the problem from the Japanese view point.

Japan is determined to solve her basic population problem by industrialization and, in pursuit of this policy, is building up her own chemical and artificial fertilizer industry. Despite many handicaps at the outset, the Japanese fertilizer manufacturers are rapidly placing their industry on a sound basis and it is only a question of a few years before they will be independent of foreign importations. The importations of sulphate of ammonium into Japan has risen from 92,000 tons in 1922 to 293,000 tons in 1926. When the fertilizer plants now under construction or planned are producing, their

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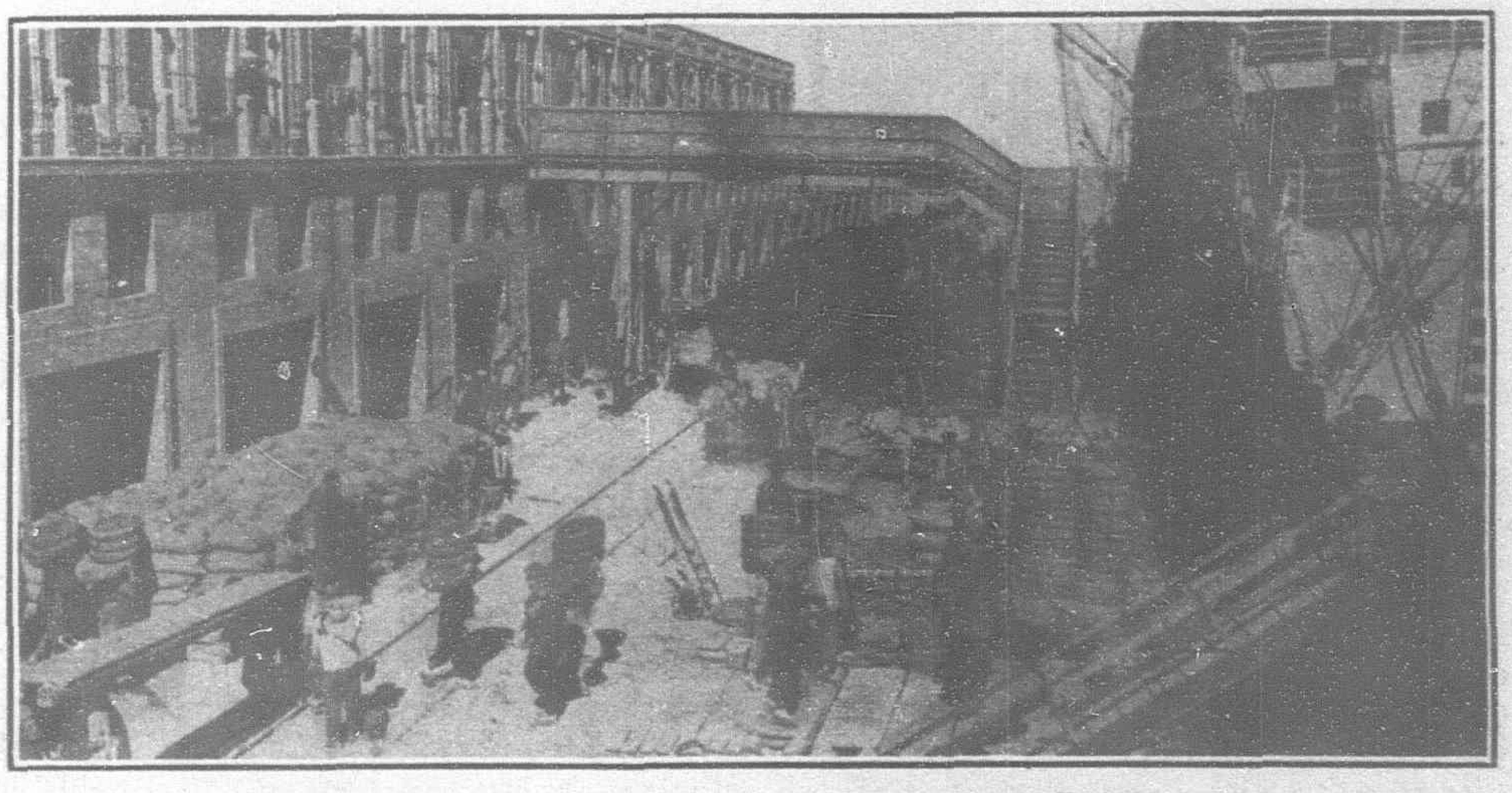
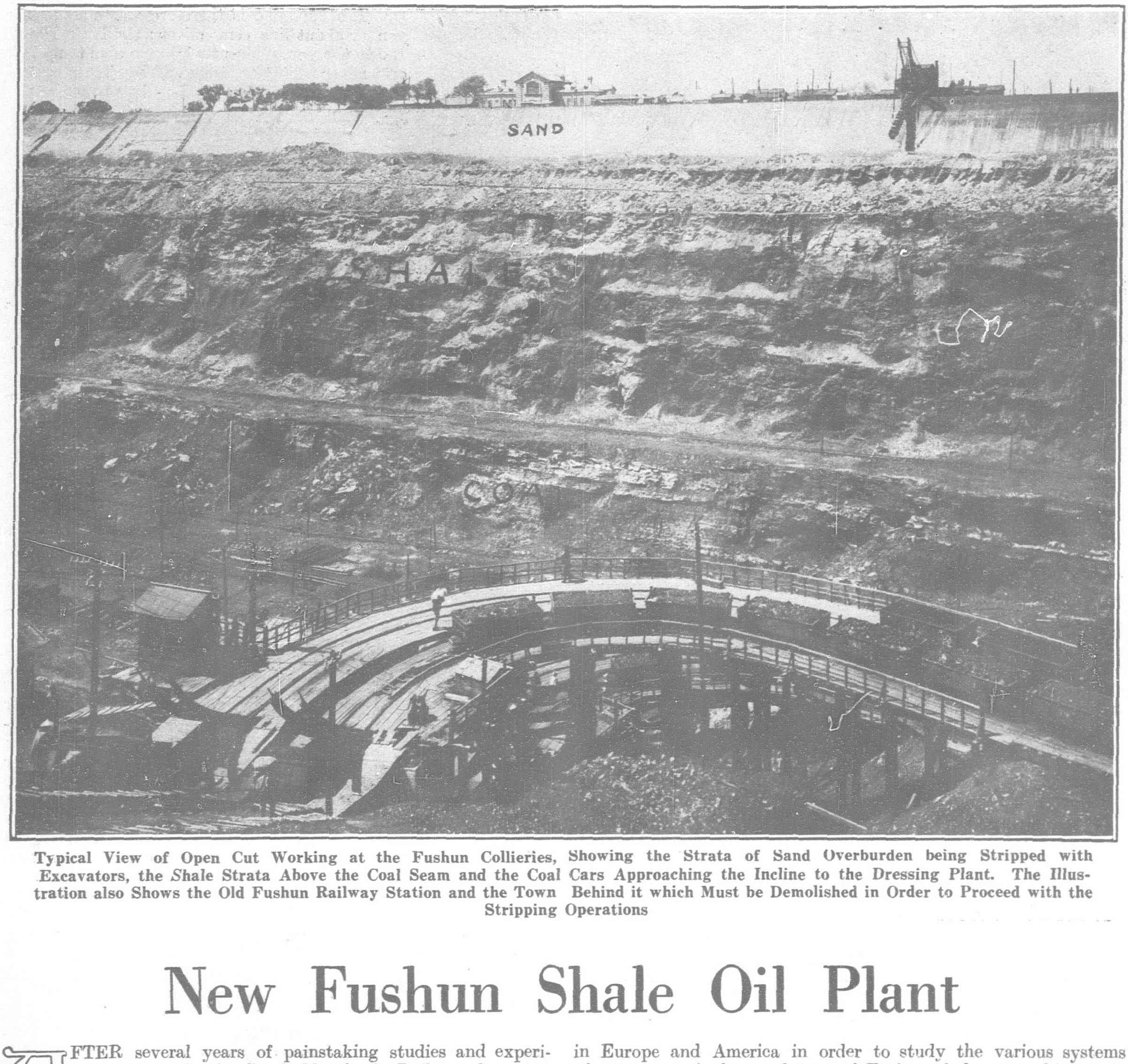


The Shipment of Bean Cake at the Wharf, Dairen

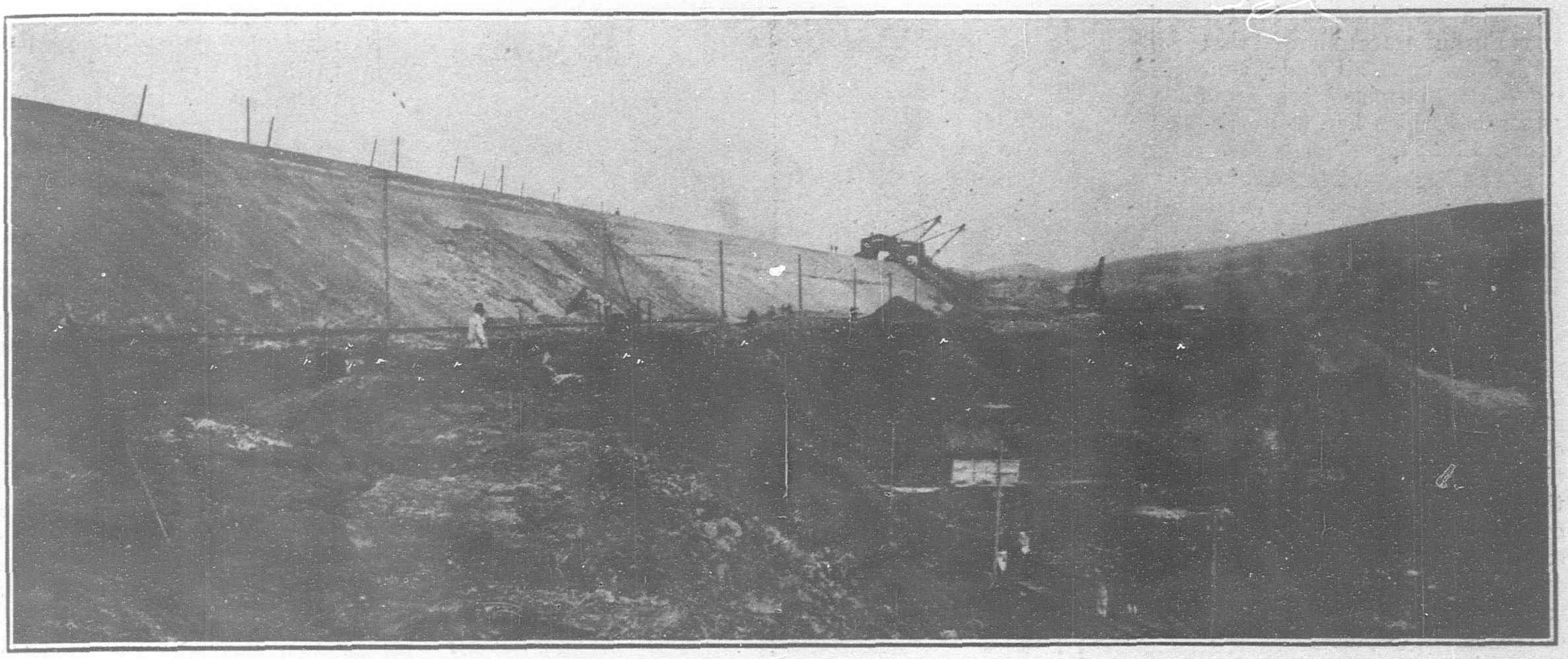


Typical View of Open Cut Working at the Fushun Collieries, Showing the Strata of Sand Overburden being Stripped with Excavators, the Shale Strata Above the Coal Seam and the Coal Cars Approaching the Incline to the Dressing Plant. The Illustration also Shows the Old Fushun Railway Station and the Town Behind it which Must be Demolished in Order to Proceed with the Stripping Operations

New Fushun Shale Oil Plant

AFTER several years of painstaking studies and experimental work, the South Manchuria Railway Company is now erecting at its Fushun Collieries, a shale oil distillation plant costing Y.10,000,000. The plant will handle 1,250,000 tons of shale per annum, yielding 50,000 tons of crude oil at four per cent. extraction, in addition to several other commercial by-products.

The history of this development goes back to 1909 (shortly after the Japanese began working the mines) when shale quarried at the Oyama Pit caught fire and disclosed the presence of an oil content which on the first analysis showed 2.6 per cent. of oil. Further tests carried out at the S.M.R. Central Laboratory at Dairen gave an extraction of 6 per cent. of heavy oil by the application of superheated steam. Large scale tests were then undertaken at the S.M.R. gas works in Dairen in 1920-21, but the yield was only 2½ per cent. These initial experiments seemed to indicate that the recovery was too insignificant to warrant the exploitation of the industry on a commercial basis. Nevertheless, the Railway's experts persevered in their studies. Mr. T. Kimura of the S.M.R. Central Laboratory, was sent to Europe where he spent several months at the works of the Scottish Oil Company, Ltd. near Edinburgh, while other experts visited all the principal shale oil plants in Europe and America in order to study the various systems of recovery. A thousand tons of Fushan shale were shipped to Scotland for testing under the Scottish dry distillation system. Other exhaustive tests were carried out at the Tokuyama Fuel Depôt of the Japanese Navy and by the Japan Fuel Association. Comparative tests were made with the Colorado and other American and European shales and various estimates of oil and by-products recovery arrived at. All these reports were received and studied by the Fushun engineers in charge of the work on the ground, who remained dissatisfied with the results obtained. They designed their own retorts and kept on experimenting until they finally evolved an entirely new system of recovery, which is claimed by them to be more economical in first cost, less complicated in operation and yielding a higher percentage and quality of oil and by-products. This system was developed and patented by Mr. Okumura, Superintendent of the Fushun Collieries in collaboration with his assistants, Messrs. Ohashi and Hasegawa and is known as the Fushun Internal Heating Method of Shale Oil Extraction. The superior advantages of the Fushun Internal Heating System over other extraction methods lies in the fact that no supplementary fuel is required. Owing to this, a less complicated furnace was made possible, lowering the initial construction cost over Y.1,500,000.

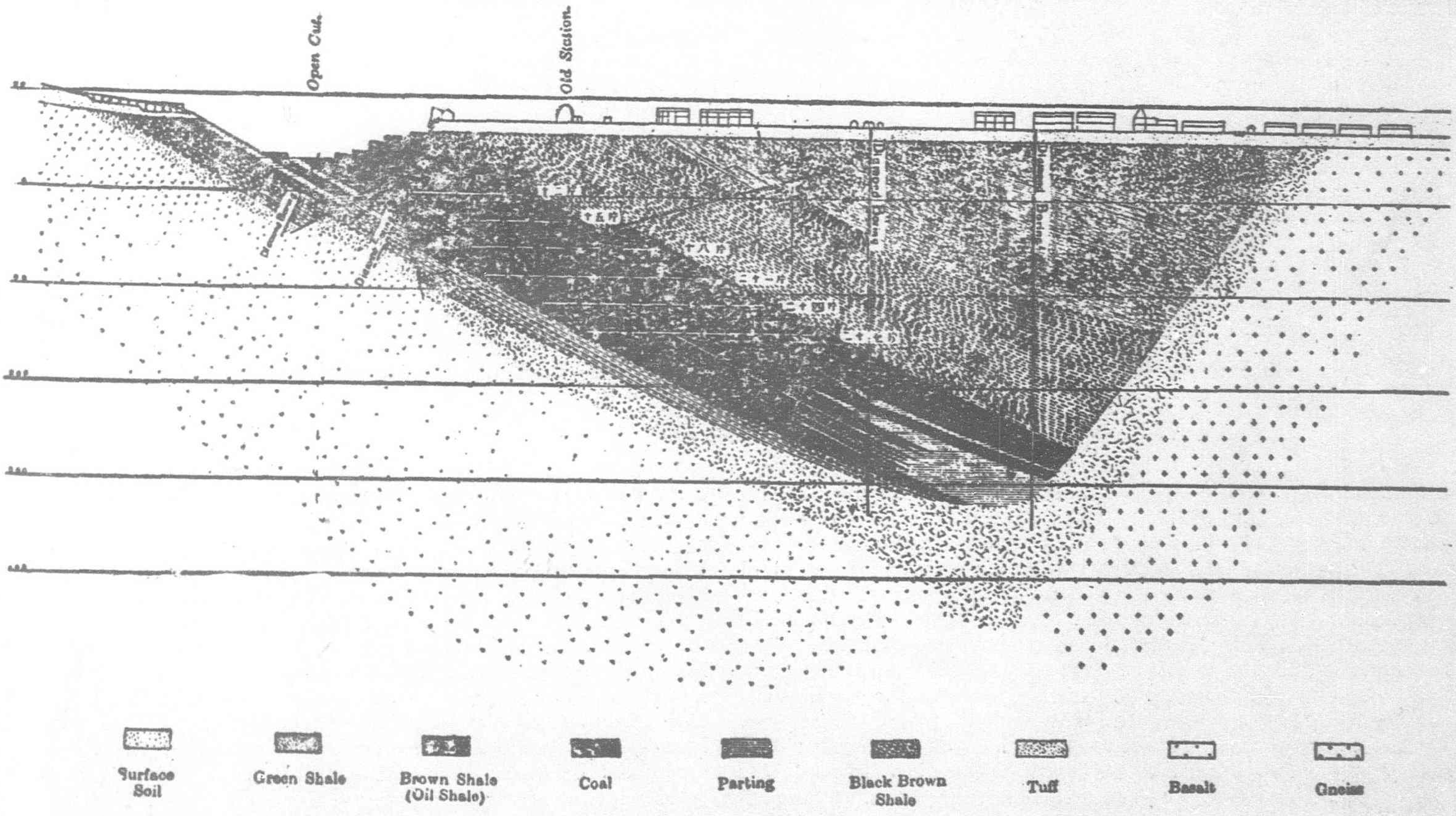


Another View of the Stripping Operations at the Fushun Open Cut Workings

In the Scottish system the only by-products recoverable are sulphate of ammonia and coke, while the Fushun process recovers the paraffine. The saving of the cost of coal fuel together with the elimination of the mining costs, materially cut down the working expenses and made possible the operation of the enterprise on a commercial basis.

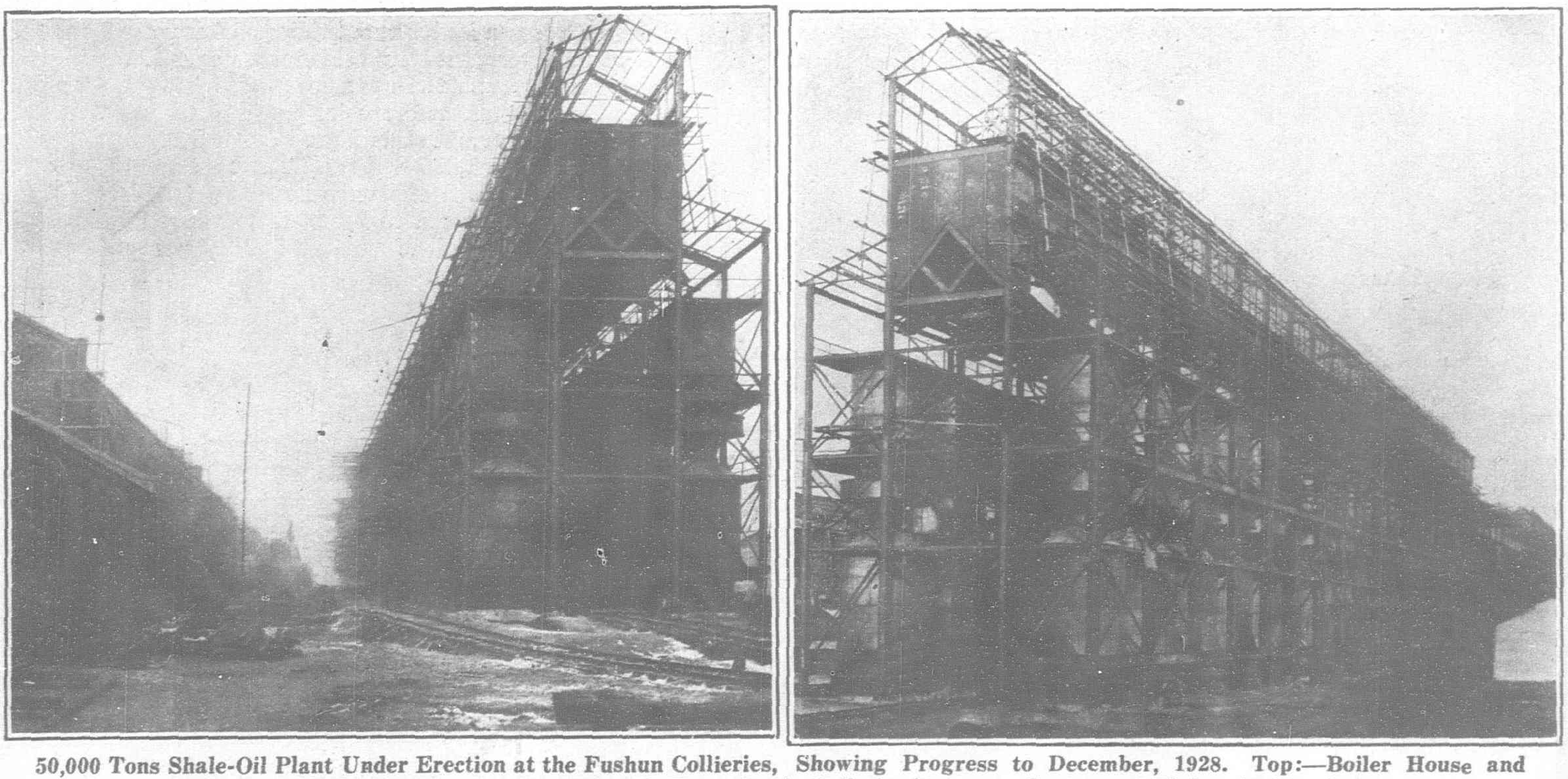
In developing the new process, a series of exhaustive tests were carried out over a period of years. The system as finally approved and adopted for commercial practice, is based on subjecting the shale to a temperature of 1,000 degrees with superheated steam and condensing the gas so generated for recovering the heavy crude oil. Two different devices were tested for comparative study. By the first device, the lower half of the oven or retort was subjected to 1,000 degrees of superheated steam in order to generate a high temperature gas passing over the shale in the upper half of the retort. The resulting gas was then led through a pipe and passed through an air and water cooling device which liberated the heavy and volatile oils and the ammonia. The cooled gas was then fed back through a hole in the center of the retort, there mixing with the high temperature gas from the lower oven, thus maintaining a continuous gas feed without the use of any auxiliary fuel.

In the second device, the initial steam temperature was reduced and, after passing through the upper oven and being cooled, was reheated in a special tank before being fed into the center of the oven. Scottish, German and other European shales have a melting point much higher than 1,000 degrees. The Fushan shale melted at this temperature caused the experiment to fail. The steam temperature was then lowered to 1,000 degrees and it was found that at this heat a heavy oil of superior quality was obtained on condensation of the final gas.



Cross Section of the Kei-Cheng-tze Open Working at the Fushun Colliery, Showing the Method of Mining

The experiments in the new Fushun retort showed that with 8 per cent. oil shale, considerable surplus gas was generated which had to be discharged into the air or burnt.



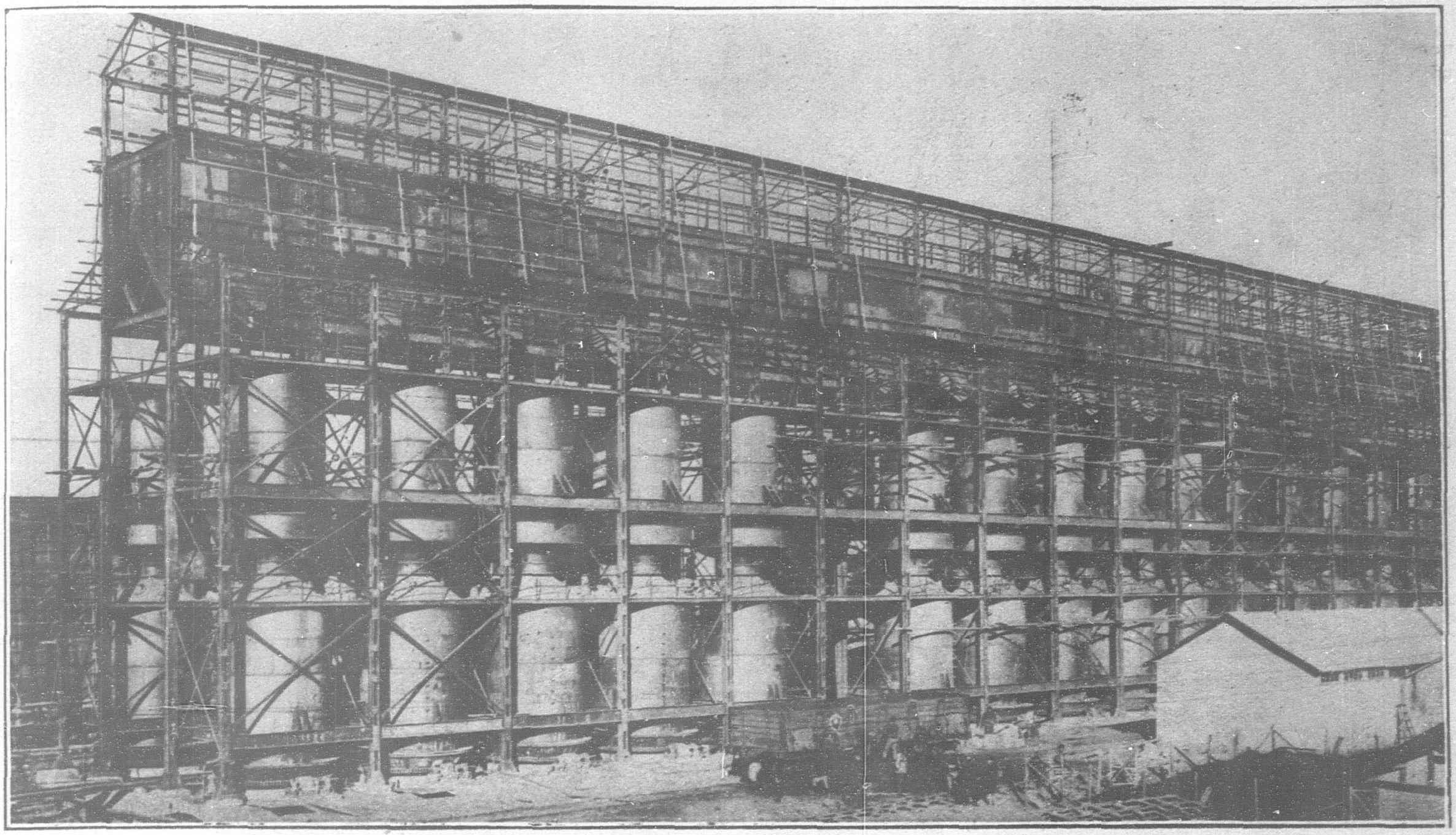
50,000 Tons Shale-Oil Plant Under Erection at the Fushun Collieries, Showing Progress to December, 1928. Top:—Boiler House and Reinforced Concrete Chimney with Elevated Water Tank Built in. Bottom:—Battery of Eighty 50 Ton Retorts

The experiments, carried on for over two years, were practically completed in March, 1927. At the outset, a small 10 ton furnace was employed, but in October, 1926, this was superseded by a 40 ton full-sized industrial unit and improved upon as the experiments progressed. The engineers in charge of the tests worked at times for days at a stretch in the laboratory without taking off their clothes to sleep. The experimental furnace was erected in close proximity to the Mond Gas Producer Plant of the Fushun Colliery in order to utilize the gas from the nearby coke ovens. The 40 ton furnace treated about 43 tons of shale per day with an oil recovery of about 97 per cent. of the total oil content. In addition, about 25 pounds of sulphate of ammonia was recovered from a ton of shale. Only when the inventors had become fully satisfied of the accuracy of their formulae and had them passed upon and approved by the highest fuel experts of Japan, did they set about designing a plant for commercial working. Nothing was left to chance. Every stage of the process was carefully checked and gone over in practice many times before it was finally adopted and the scheme laid before the Ministry of Finance in Japan for approval. Official sanction for starting the industry was given by the Central Government in May of last year.

The plans as finally approved, call for the installation of a battery of eighty 50 ton retorts, treating 4,000 tons of shale per day, or, 1,250,000 tons per year of 300 working days. These retorts and the steel frame work supporting them have been furnished by the Kawasaki Dockyard of Kobe, Japan, and are being erected by the Manchuria Dock Company of Dairen. The shale is to be transported from the Open Cut Workings by direct railway connection. For this service 60 special 60 ton steel dumping cars costing Y.14,000 each have been purchased from the Magor Company of New York through the Mitsui Bussan Kaisha. These cars are now being erected at the Fushun Colliery Machine Shops. It is understood that the initial order will be duplicated later on.

These cars will discharge the shale into a storage bin which feeds the crushers. There will be two sets of crushers having a total capacity of 10,000 tons a day (one a Fairbanks and the other a Simonds) set to crush the shale to pass through a ¾ inch mesh, this being found the best size for treating in the retorts. The larger and smaller sizes passing through the crushers are to be used for sand-flushing in the mines. The spent shale from the retorts will also be conveyed to a special storage bin and loaded into cars for transportation to the mining shafts for sand-flushing purposes. From the crusher bin, the ¾ inch shale stones till be elevated to the top of the retorts discharging into an overhead conveyor that distributes and feeds the shale to the battery.

The heavy oil recovered from cooling the gas generated in the retorts, will be carried to a distillation plant. The equipment for this process, as well as for refining the paraffine and crystallizing has been purchased in Czecho Slovakia at a cost of Y.1,000,000. The eighty retorts are divided into batteries of 20 units each battery having its own blower-house and blower equipment. The spent shale will be discharged automatically from the bottom of the retorts into a conveyor running through an underground concrete compartment. From this, the shale is delivered to another underground conveyor discharging into the spent shale bins.



Front View of Battery of Retorts of the Shale Oil Distillation Plant at Fushun

The 1,250,000 tons of shale treated annually is calculated to produce the following: 50,000 tons of crude oil; 5,000 tons of coke; 10,000 tons of crude paraffine; 18,000 tons of sulphate of ammonia.

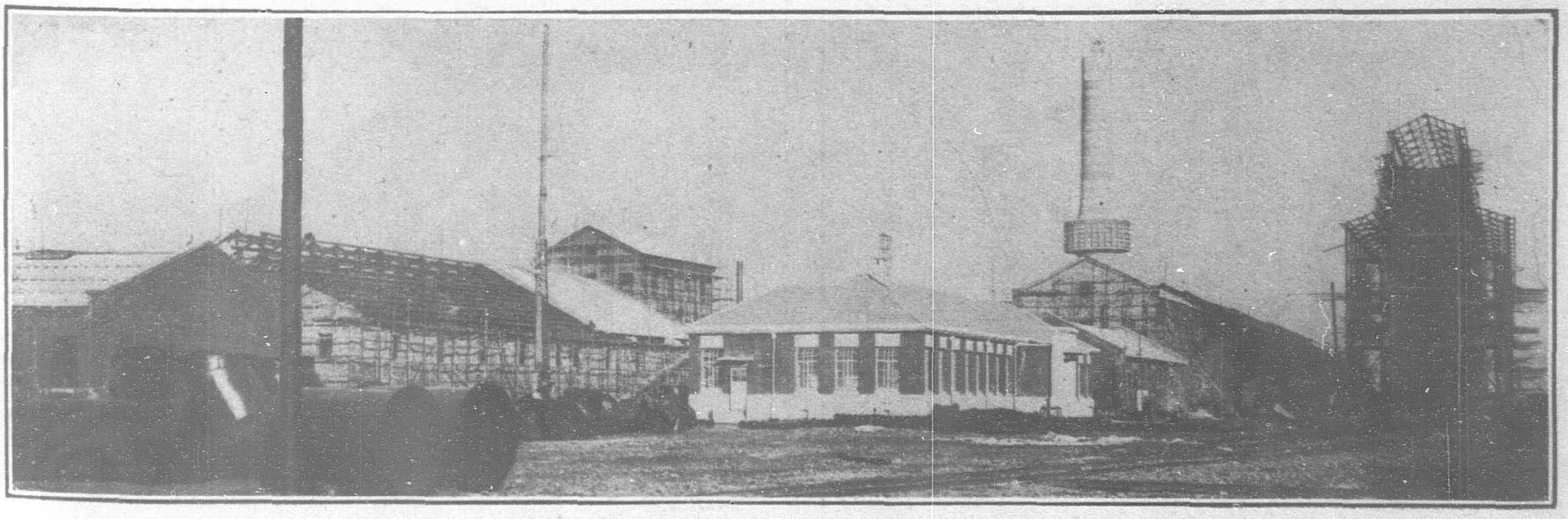
The total cost of the plant is placed at Y.10,000,000, divided as follows:—

80-50 ton retorts, including steel framework, sulphate of ammonium recovery plant, tanks and weighing machine	Y.5,000,000
Crude Oil Distillation Plant, including Paraffine recovery equipment	1,200,000
Boiler Room and Chimney	1,000,000
Crushing Plant, Railway Tracks, Cars, etc ..	1,100,000
Hoisting and Conveying System	250,000
Miscellaneous	1,450,000

The work is being rapidly pushed ahead in order to start production in October or November of the present year. As shown in the accompanying illustrations, the erection of the battery of retorts is well under way; all the foundations have been completed and the buildings and chimney erected. Considerable mechanical equipment is already on the ground ready for installation.

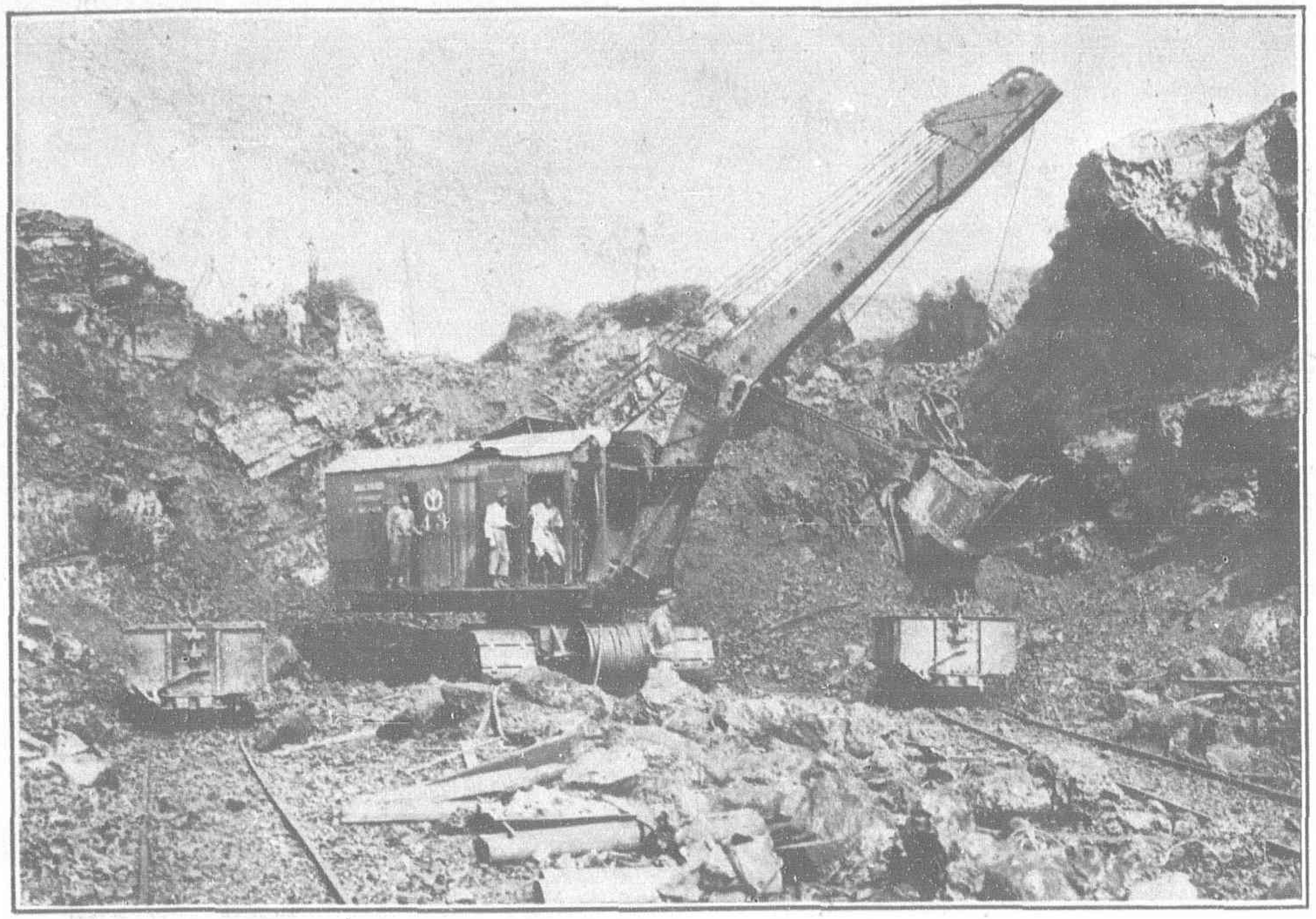
There have been many estimates made of the total volume of oil shale overlaying the Fushun coal deposits as well as exhaustive analysis of the oil content and recoverable commercial products. The main coal seam, extending for nearly ten miles, is covered by a strata of oil-bearing shale averaging about 400 feet in thickness. The total oil shale reserve is placed at over 5,000,000,000 tons. The oil content varies according to the depth of the shale from the top. The topmost seam is of the highest quality, the deepest seam next to the coal, being the poorest. The oil content varies from 1 to 14 per cent., the average being 5-6 per cent. If the lower or coal strata of shale be eliminated, the average oil content is 7-8 per cent. There are many localities where the shale if mined exclusively at that point, will yield 10 per cent. and a handsome profit to the new undertaking. However, the object of the S.M.R. is to mine and market the Fushun Coal; the oil shale enterprise being secondary to its main business.

Before reaching the shale strata, there is an overburden of surface soil and sand of 30 to 40 feet in thickness which has to be stripped by excavators, carted away and dumped at convenient locations. The development of the Open Cut Mining program

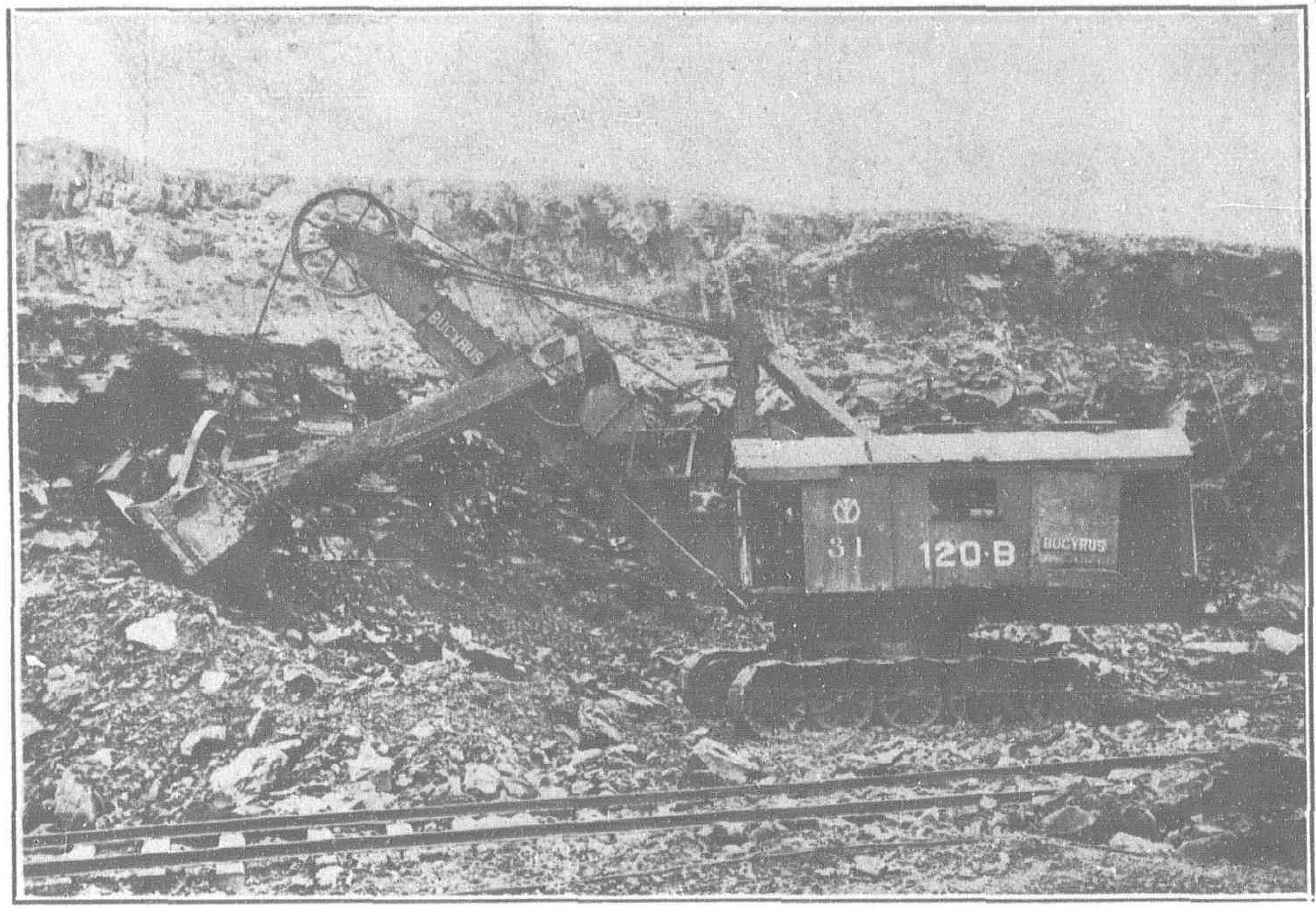


General View of Fushun Shale Oil Plant Under Erection, December, 1928

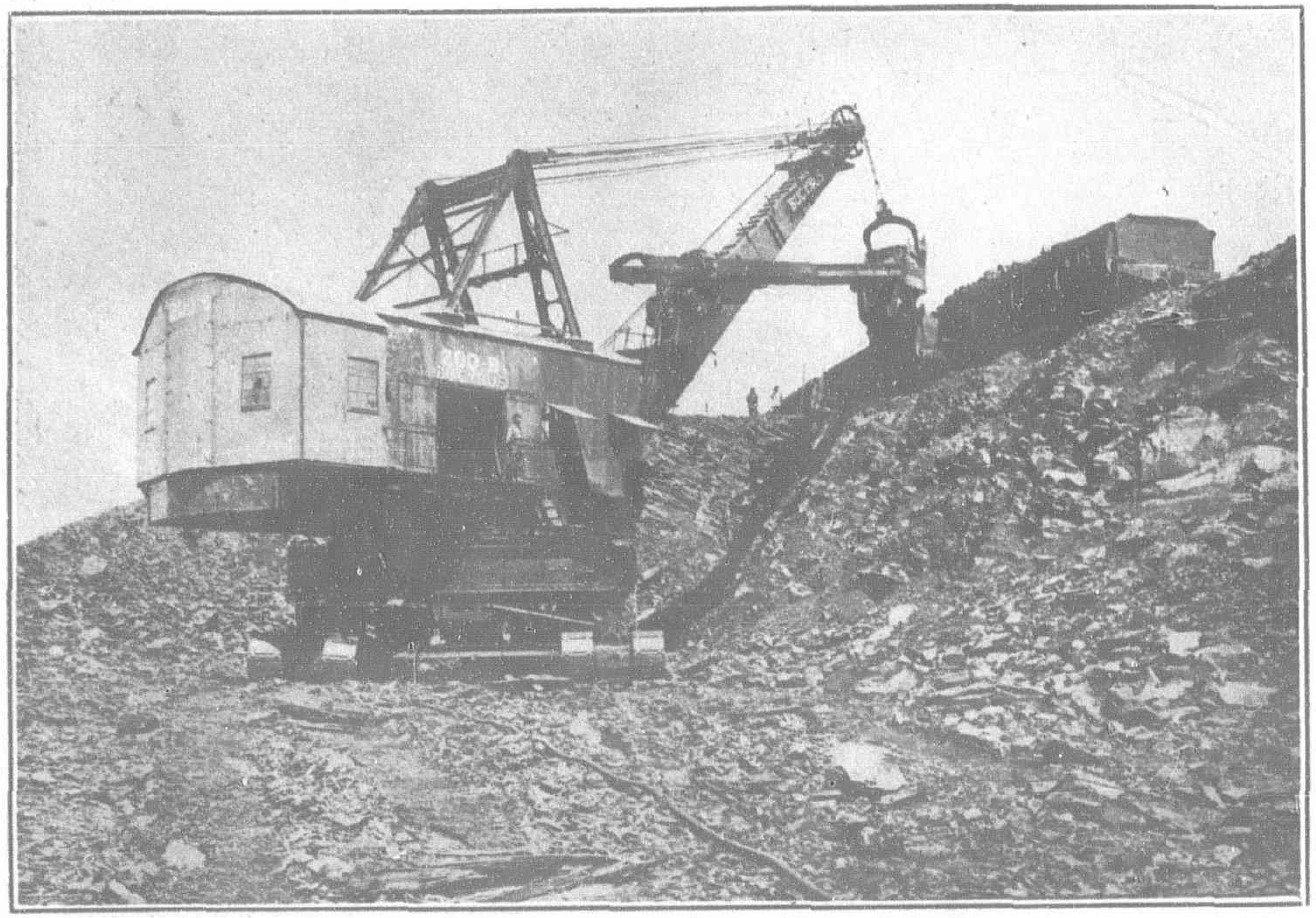
AMERICAN ELECTRIC SHOVELS IN OPERATION AT FUSHUN



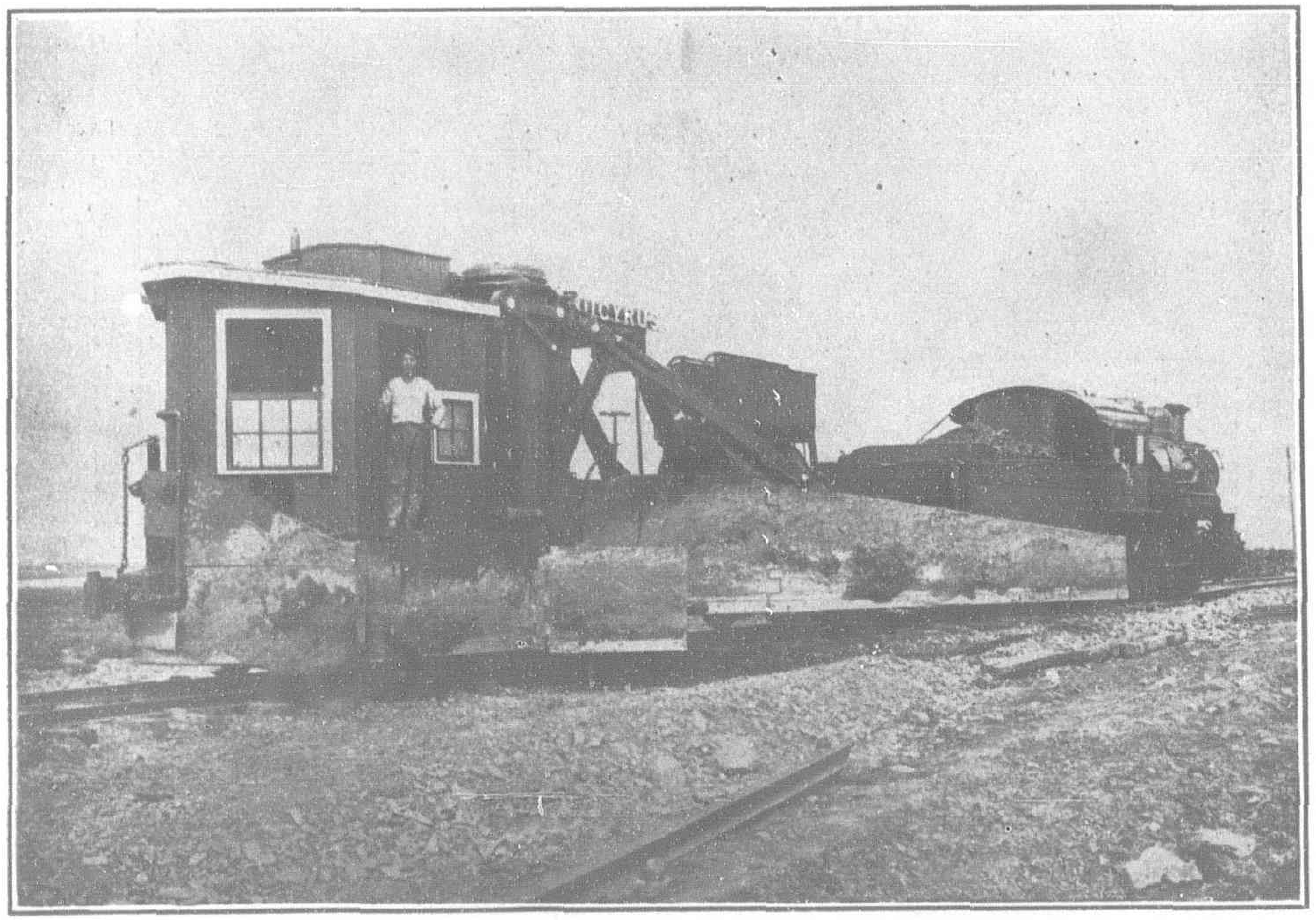
2 Cubic Yard Bucyrus-Erie Electric Shovel Loading Coal at Fushun



Heavy Duty Bucyrus-Erie, 4 Cubic Yard Electric Shovel Digging Shale at Fushun



6 Cubic Yard Bucyrus-Erie Electric Shovel Digging Shale at Fushun



Class 50 Bucyrus-Erie Spreader used for Spreading at the Spoil Bank, Fushun

necessitates the removal of the shale strata, the disposal of which is a serious problem unless it can be treated for its chemical properties. Consequently, the main mining operations will not permit of concentrating upon the richer shale for oil recovery. The shale must be treated as it comes from the excavation without selection for quality. For this reason, taking the average run of the shale, the estimates for recovery at the new shale oil plant is based on a four per cent. oil content in the shale with a 97 per cent. extraction; a safe and conservative estimate. The new enterprise bases its hopes of commercial success, not so much on the proceeds of its crude oil recovery as from the other by-products. A ton of shale with an average 8 per cent. oil content is estimated to give the following yield in by-products :—

Gasolene 1.50 gallons; Lighting Oil 4.22 gallons; Volatile and Fine Oil 5.58 gallons; Lubricating Oil 1.54 gallons; Paraffine 20 pounds; Sulphate of Ammonia 40 pounds.

The above figures must be reduced one half in order to tally with the production estimates on a four per cent. basis of heavy oil recovery. The entire output of oil products from the Fushun plant is to be purchased by the Japanese Navy Department at a stipulated price and delivered to the Navy Fuel Depôt at Tokuyama, Japan.

In addition to the by-products listed above, lysol of a high quality has also been recovered from the tar residue. Other important chemicals and disinfectants have been extracted by the S.M.R. Central Laboratory experts and although these products do not figure prominently in the present working estimates, it is hoped that in time their recovery can be made commercially feasible in order to liberate Japan from her present dependence upon foreign importations of disinfectants.

The total oil shale reserves in the Fushun Mining Zone is estimated at 5,000,000,000 tons. Based on a four per cent. extraction, these reserves would theoretically yield 200,000,000 tons of crude oil and other by products. The excavation, however, must be confined to the Open Cut Workings and the commercial oil shale limited to the actual quantities excavated according to the program laid down for development over a period of 20 to 30 years. Mr. L. P. Davenport, the American Consulting Engineer engaged by the S.M.R. to report on the Open Cut Workings and lay out a program of development, estimates the total quantity of shale to be excavated between 1923 and 1942 at 50,000,000 cubic meters, the average yearly quantity from 1927 to 1942 being 3,200,000 cubic meters or, about 5,600,000 tons. Another estimate submitted by Mr. T. Umuna, Superintendent of the Open Cut Workings, gives a total shale excavation of 80,000,000 cubic yards, or 120,000,000 cubic tons in the 20 years from 1926 to 1945, a rough average of 6,000,000 tons per year. Mr. Davenport's estimates are based on mining 3,000,000 tons of clean coal per year from the Open Cut Workings. In 1927, the output from these workings was 2,448,000 tons, so it is fair to estimate that the annual commercial shale output for the next twenty years will not exceed 6,000,000 tons or sufficient to provide 240,000 tons of crude oil per year, in addition to the other by-products recoverable.

Although we understand that all the shale excavated would be treated for oil recovery, it is quite possible that this program may be modified to the extent of discarding as commercially valuable the shale strata for 100 feet above the top of the coal seam and concentrating upon the richer stratas. In Mr. Davenport's estimates for mining the oil shale he disregarded the lower 100 feet as suitable for retorting. An idea may be formed of the percentages of oil in the shale stratas from the accompanying chart of three typical borings analyzed at the S.M.R. Central Laboratory at Dairen. In the event that operations are confined to the top and center shale stratas, an average 8 per cent. recovery is possible, thus doubling the output of oil and by-products but lowering the quantity of available commercial shale by about one third and necessitating its dumping at some convenient location. This would lower the quantity of commercial shale mined per annum to about 4,000,000 tons. Assuming an eight per cent. average oil content, this would permit the recovery of nearly 320,000 tons of crude oil. A recent report of the S.M.R. gives the total amount of coal that can be profitably excavated from the Open Cut Workings at 200,000,000 tons. The excavation program laid down for the development of these workings being 3,000,000 tons of coal per year, the time limit of profitable working of the oil shale is therefore approximately 67 years from date. If all the shale is retorted and four per cent. crude oil extracted, the total oil recovery would be approximately 16,000,000 tons. If the lower strata of poor shale be left out of the calculation, the total oil recovered in 67 years would be about 21,440,000 tons, or, one tenth of the oil in the total shale reserves.

The Japanese demand for crude oil and kerosene is about 2,500,000 tons per year of which only 500,000 tons is supplied by the home oil wells. Japanese writers have stressed the fact that the Fushun shale deposits can supply to oil requirements of Japan for the next 300 years, but this dream can only be realized by utilizing the entire five billion tons of shale with an oil recovery of 6-7 per cent. It is impossible that as time passes and the Japanese experts make further investigations and experiments, that some economical method of excavating the shale and recovering the oil and by-products as a purely independent commercial proposition, will be devised, but for the present it is unnecessary to go outside the actual yearly estimated quantities of shale excavated in order to uncover the coal seam underneath. It goes without saying that the Japanese with their characteristic enterprise, will increase the capacity of the present 1,250,000 ton plant if it proves profitable, and as they have worked everything out carefully beforehand, this seems to be assured. In this event, the capacity of the plant at Fushun will be increased to handle the entire volume of shale excavated annually, or 6,000,000 tons, producing 240,000 tons of crude oil. This expansion will call for the further investment of at least Y.50,000,000 in new plant and machinery.

The thoroughness with which the Japanese are taking up this proposition is seen in the resolution of the S.M.R. to erect a paraffine refinery in Japan. Paraffine having a melting point of 45 degrees or over is subjected in Japan to an import duty of Y.200 per ton; under 45 degrees it enters free. The Fushun by-product has a melting point of 55 degrees, which, if sold in Japan would pay a duty of Y.2,000,000. In order to save this duty, the S.M.R. will erect a paraffine refinery at Osaka at a cost of Y.1,500,000. The crude paraffine as it is recovered at Fushun will be mixed with oil to lower its melting point to 45 degrees so the product can enter Japan free of duty. Here it will be refined and manufactured into candles and other marketable products. The site at Osaka for the new refinery has already been acquired and erection of the plant will be started in April in order that it will be ready for operation in October when the new Fushun Oil Shale plant is scheduled to begin operations.

Book Notes

China and Russia

Russo-Chinese Diplomacy by Ken Shen Weigh, PH. D.; "Commercial Press," Shanghai.

Dr. Weigh's book must be divided into two parts: the first seven chapters are important, scholarly, erudite; Chapter VIII is unmitigated blah, written apparently at the last moment and interpolated in an otherwise excellent volume. It is unfortunate that Dr. Weigh permitted himself to be misled from scholarship to propaganda, from fact to apology. Perhaps Dr. Weigh, now that he has seen his work in print, will ask the Commercial Press to omit Chapter VIII from future editions. Then he might write another book, as ably as this was done, on Russia's relations with the Kuomintang from 1924 to 1927. The unfortunate impression of Chapter VIII, however, is lessened by his Preface, which is more in harmony with the tone of the remainder of the book.

The fact must be noted, however, that here is a book published in 1928 on the relations between China and Russia in which the name of Borodin never appears!

The story of Russia's effort to conquer China by military force, by political intrigue, by peaceful penetration, by railway agreements and by Communist propaganda has been continuous from the days of Muravev-Amursky to the present days. The shameless participation of Franco-Belgian finance almost achieved the partition of China. This story, from varying standpoints, is told in Paul Hibbert Clyde's "International Rivalries in Manchuria (1689-1922), in Philip Joseph's "Foreign Diplomacy in China (1894-1900) and in George Bronson Rea's "Hoover in China" in the *Far Eastern Review*.

Dr. Weigh's book is a Chinese contribution to this subject and he does his job well, except that one would have enjoyed more evidence from purely Chinese sources, which may now be available to Dr. Weigh, who is connected with the Ministry of Foreign Affairs.

(*Continued on page 79*)

Electrical Undertakings in Manchuria

Dairen Power Plants of the South Manchuria Electric Company, Ltd.

no. 1 **Hamacho Power Station**

no. 2 **Amanogawa Power Station**

It is not always feasible to obtain up-to-date information on Japanese private enterprises in South Manchuria on which to base a full report on any particular industry. Enough, however, is known of the electrical undertakings in this region to warrant the statement that outside of Japan Proper, no country in the Far East is making greater progress. For many years, the supply of light and power to the towns in the Railway Zone was practically monopolized by the Railway Company, not so much with the idea of deriving a profit from the investment, as to serve the public. Although fair results were being obtained from operating these plants, the Railway Company decided in 1925 to turn them into private enterprises. All of the smaller plants serving the minor towns along the railway were organized into individual companies, while the larger and more important ones were turned over to a company organized in 1926 under the name of the South Manchuria Electricity Company, Limited, with a capital of Y. 22,000,000, in which the Railway holds a controlling interest. The important power plants at the Fushun Collieries and the Anshan Iron & Steel Works and the smaller plants at the Shakako Railway Shops were retained as part of their respective enterprises. The electrical plant at Port Arthur and Chinchow are operated as official enter prises of the Kwantung Government and the one at Newchwang by a private Sino-Japanese Company.

S. M. Electric Company

The new South Manchuria Electric Company operates five public service light and power plants located at Dairen, Changchun, Antung and Lienshankuan with 9 sub-stations, 175 miles of aerial transmission lines, 522 miles of distributing mains and 33,198 kilometers of tramways. The two principal plants are located at Dairen, one at Hamacho serving the city of Dairen proper and the other at Amanogawa supplying the west suburbs and industrial district.

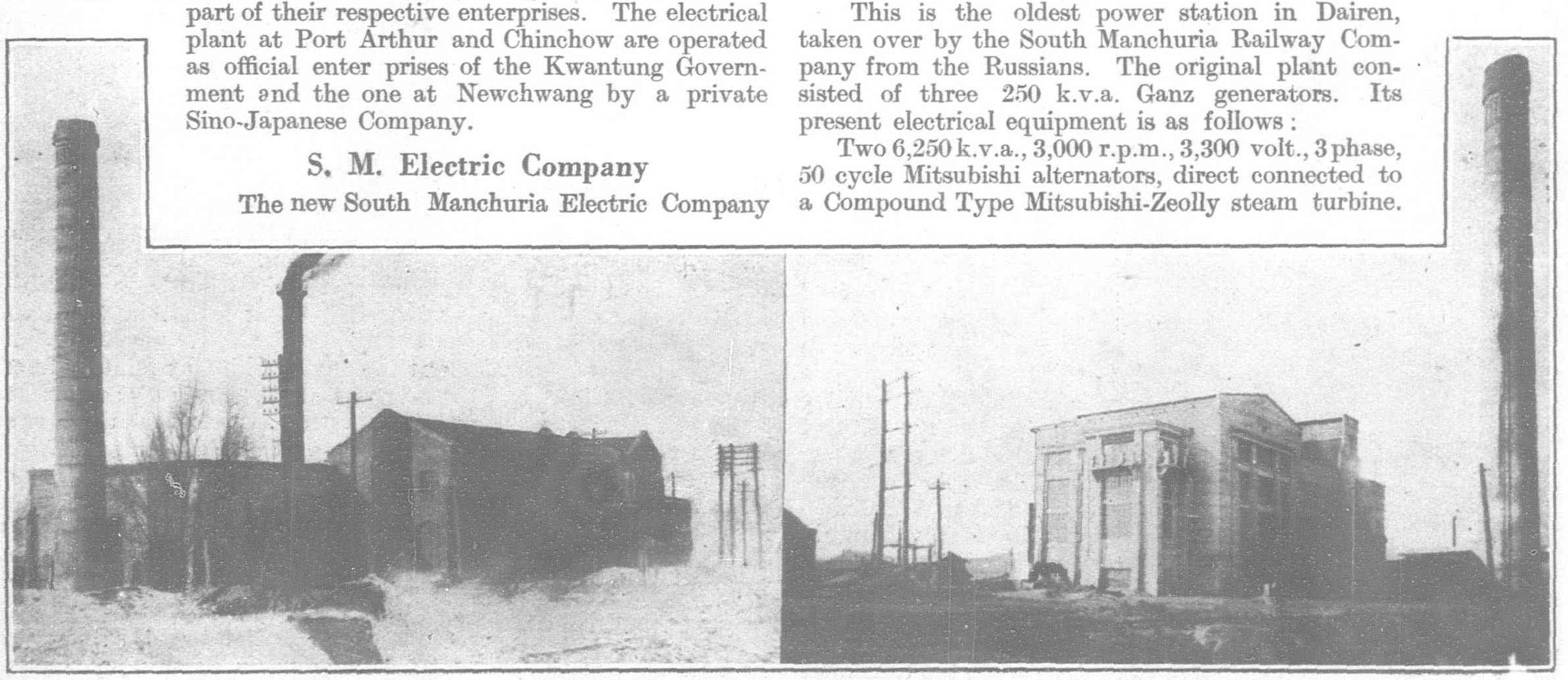
New Star Beach Power House

A third plant at Dairen is in course of erection at Hoshigaura or Star Beach. This popular summer resort is now the fashionable residential district of the port. A new addition to the existing hotel is being built, a Chinese hotel is going up on another section of the beach and numerous villas are springing up on all sides. To meet the demand for light and power the S. M. Electricity Company is building a new plant equipped with a 12,000 k.w. Brown, Boveri turbo-alternator. Steam is generated in Babcock & Wilcox boilers using pulverized coal as fuel supplied from a Holbeck plant.

The Hamacho Power Station, Dairen

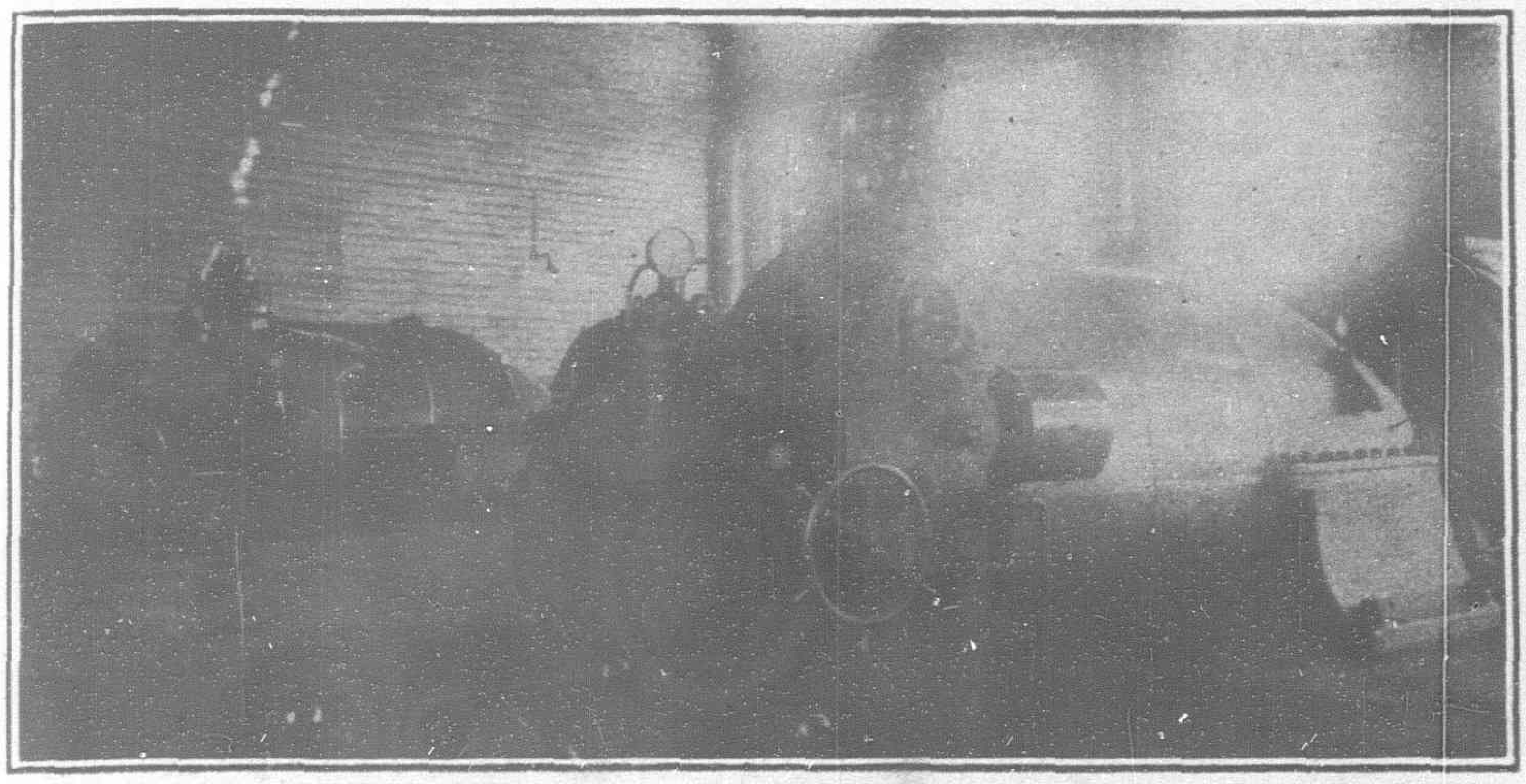
This is the oldest power station in Dairen, taken over by the South Manchuria Railway Company from the Russians. The original plant consisted of three 250 k.v.a. Ganz generators. Its present electrical equipment is as follows:

Two 6,250 k.v.a., 3,000 r.p.m., 3,300 volt., 3 phase, 50 cycle Mitsubishi alternators, direct connected to a Compound Type Mitsubishi-Zeolly steam turbine.



Power Plants of the S. M. Electric Co., Ltd.

Changchun Power Station **Antung Power Station**



Power House of the Anshan Iron and Steel Works, Showing Two 10,000 k.w. Brown, Boveri Turbo-Alternators

One 1,875 k.v.a., 1,500 r.p.m., 2,300 volt, 3 phase, 25 cycle G. E. alternator directly connected to a Curtis steam turbine made by the General Electric Company.

One 1,875 k.v.a., 3,300 volt, 3 phase, 50 cycle Shibaura alternator coupled to a Curtis steam turbine furnished by General Electric Company.

The three exciters, of which two were supplied by Mitsubishi and one by the Shibaura Engineeting Works.

During the last two and a half years, the total energy generated has increased from 11,859,086 k.v.a. to 14,700,410 k.v.a.

The Amanogawa Power Station, Dairen

This power station was started in 1922 with a 6,250 k.v.a., 3,000 r.p.m., 11,000 volt, three phase, 50 cycle Westinghouse alternator, directly connected to a 5,000 k.w., 3,000 r.p.m. Parsons turbine manufactured by Westinghouse Electric and Manufacturing Co. In 1924, the capacity of the plant was increased by the installation of one A.S.E.A. alternator of the same capacity as the above, directly connected to a 5,000 k.w., 3,000 r.p.m. Stal steam turbine. There are three exciters (one in reserve) furnished by the Westinghouse Electric and Manufacturing Co., S.T.A.L. Works and Hidachi Engineering Works, respectively. The boilers, four in number, are from Babcock & Wilcox, Ltd. The plant has a total generating capacity of 16,195,102 k.w.h. half yearly with an average daily output of 88,498 k.w.h.

The above two stations are supplying electricity to about 30,000 consumers in Dairen and its neighboring districts. The total number of lamps is about 230,000, while 14,000,000 k.w.h. of electricity is consumed for power purposes, the bulk consumers being ship building concerns, iron works, flour mills and ice-making factories.

The following is the scale of charges for electricity in and around Dairen :

Y. 0.19 per kilowatt-hour if kilowatt-hours consumed are less than 3 per month
Y. 0.17 per kilowatt-hours if kilowatt-hours consumed are between 3 and 6 per month
Y. 0.14 per kilowatt-hour if kilowatt-hours consumed are between 6 and 10 per month
Y. 0.11 per kilowatt-hour if kilowatt-hours consumed are more than 10 per month.

For a lamp,	10 watt	Y. 0.70	per month
ditto	20 watt	.95	ditto
For a lamp,	30 watt	Y. 1.10	per month
ditto	40 ,,	Y. 1.35	ditto
ditto	60 ,,	1.75	ditto
ditto	100 ,,	2.60	ditto
ditto	200 ,,	4.45	ditto
ditto	300 ,,	5.95	ditto
ditto	400 ,,	7.45	ditto

FOR POWER.

Y. 0.065 per kilowatt-hour, if kilowatt-hours consumed are less than 100 per Horse Power, ½ to 10 per month
Y. 0.040 per kilowatt-hour, if kilowatt-hours consumed are more than 200 and less than 300 per Horse Power, ½ to 10 per month.
Y. 0.060 per kilowatt-hour, if kilowatt-hours consumed are less than 100 per Horse Power, 10 to 30, per month.
Y. 0.037 per kilowatt-hour, if kilowatt-hours consumed are more than 200 and less than 300 per Horse Power, 10 to 30, per month.
Y. 0.055 per kilowatt-hour, if kilowatt-hours consumed are less than 100 per Horse Power, 30 to 50, per month.
Y. 034 per kilowatt-hour, if kilowatt-hours consumed are more than 200 and less than 300 per Horse Power, 30 to 50 per month.

For Heating, Cooking, etc.,
Y. 0.05 is charged per kilowatt-hour.

The Changchun Power Station

The Changchun Power Station started operation on February, 1910, with one 250 k.v.a. alternating current generator transferred from the Hamacho Power Station. In the same year, one 500 k.v.a. alternator was added to the plant. In order to supply power to the Changchun Mill of the Manchuria Flour Milling Co., Ltd., another 500 k.v.a. alternator was installed in 1914, and two more alternators of the same capacity, in 1920.

The plant is now equipped with the following ; Two 500 k.v.a., 3,300 volt, 3 phase, 42 cycle, 360 r.p.m. alternators manufactured by the Shakako Works of the South Manchurian Railway Company, coupled direct with a 600 h.p. Belliss Morcom engine.

One 1,250 k.v.a., 3,300 volt, 50 cycle, 3,000 r.p.m. A.S.E.A. alternator directly connected to a 1,000 k.w. Ljungstrom Steam turbine made by Stal.

One 1,250 k.v.a., 3,300 volt, 50 cycle, 3,000 r.p.m. Mitsubishi alternator, directly coupled with a 1,000 k w Ljungstrom steam turbine manufactured by Mitsubishi

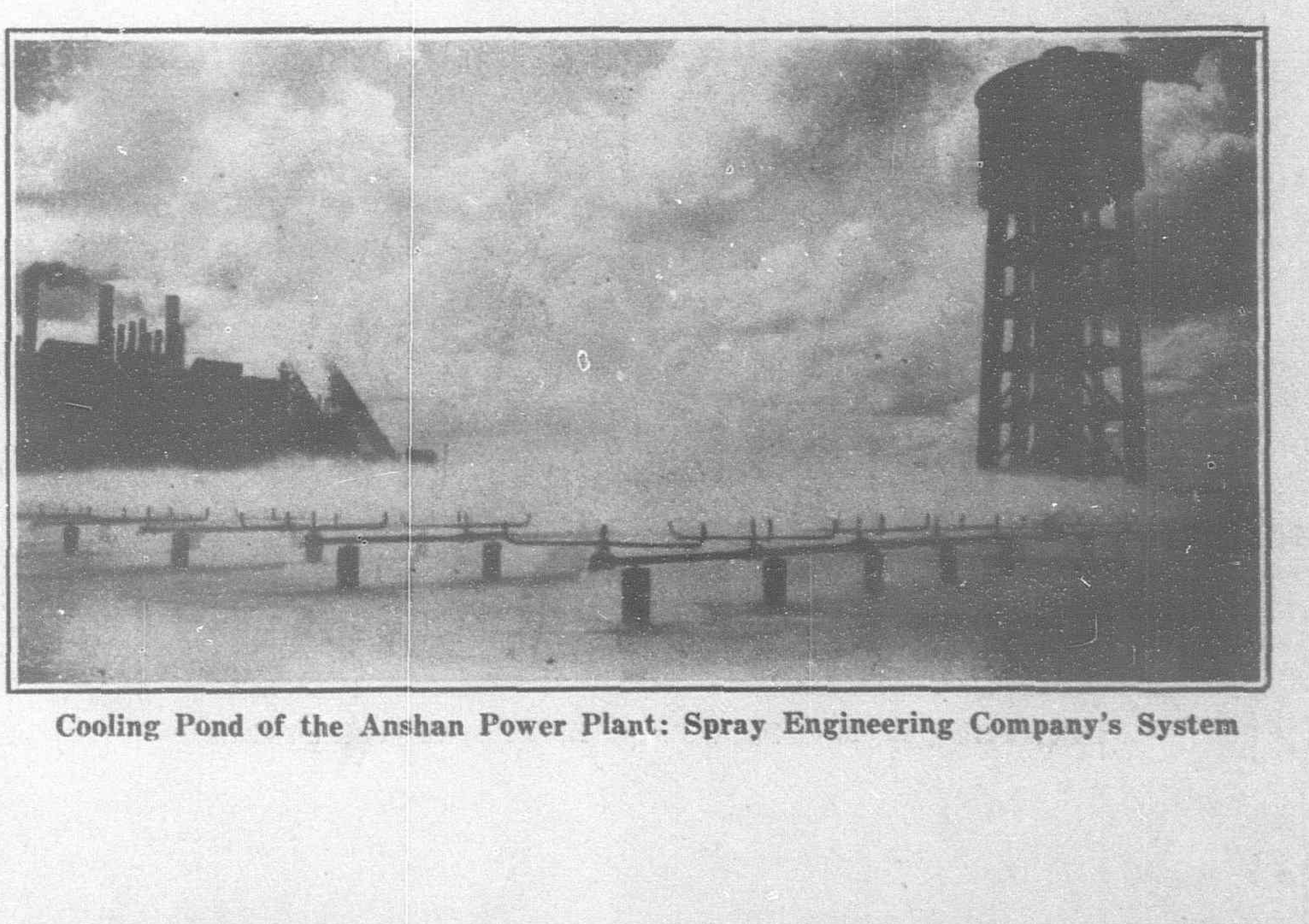
The exciters, four in number, are each of 110 volts One exciter with a 18 k w. capacity was furnished by the A.S.E.A. Works, 20 k.w. capacity each, by the Shakako Works. There are six boilers, five Babcock & Wilcox, and one Takuma.

In this territory, there are 4,476 consumers with a total of 37,089 lamps and 2,541,040 k.w.h. of electricity is consumed for power purposes half yearly. The scale of charges for this district is almost same as that of Dairen.

The Antung Power Station

Inaugurated on December, 1908, this station was under the management of the Antung Electric Co. Ltd. until 1911, when the South Manchuria Railway Company took over the business.

At present, the generating equipment consists of the following: Two 3,750 k.v.a., 3,300 volt, 50 cycles, 3,000 r.p.m. Westinghouse turbo-generators, directly connected to a 3,000 k.w. Parsons steam



Cooling Pond of the Anshan Power Plant: Spray Engineering Company's System

turbine made by Westinghouse Electric and Manufacturing Company and two 500 k.v.a., 3,300 volt, 50 cycle, 375 r.p.m. alternators manufactured by the Shakako Works, directly connected to 600 h.p. Bellies engines. There are three Babcock and Wilcox boilers.

The territory has 8,648 consumers with a total of 49,969 lamps. The consumption for power purposes is 2,967,960 k.w.h. half yearly.

The Lienshankuan Power Station

This plant is the smallest operated by this Company. There are two 50 k.v.a., 2,200 volt, 60 cycle, 900 r.p.m. alternating current generators made by the Okumura Electric Manufacturing Co. These are coupled with a 70 h.p. semi-Diesel engine manufactured by Pater & Co. England. The two exciters with 2 k.w. capacity each were supplied by the Okumura Electric Manufacturing Co. In Lienshankuan and its neighboring districts, only 261 consumers are served. The total number of lamps is 703, and 25,100 k.w.h. of electricity is consumed for power purposes.

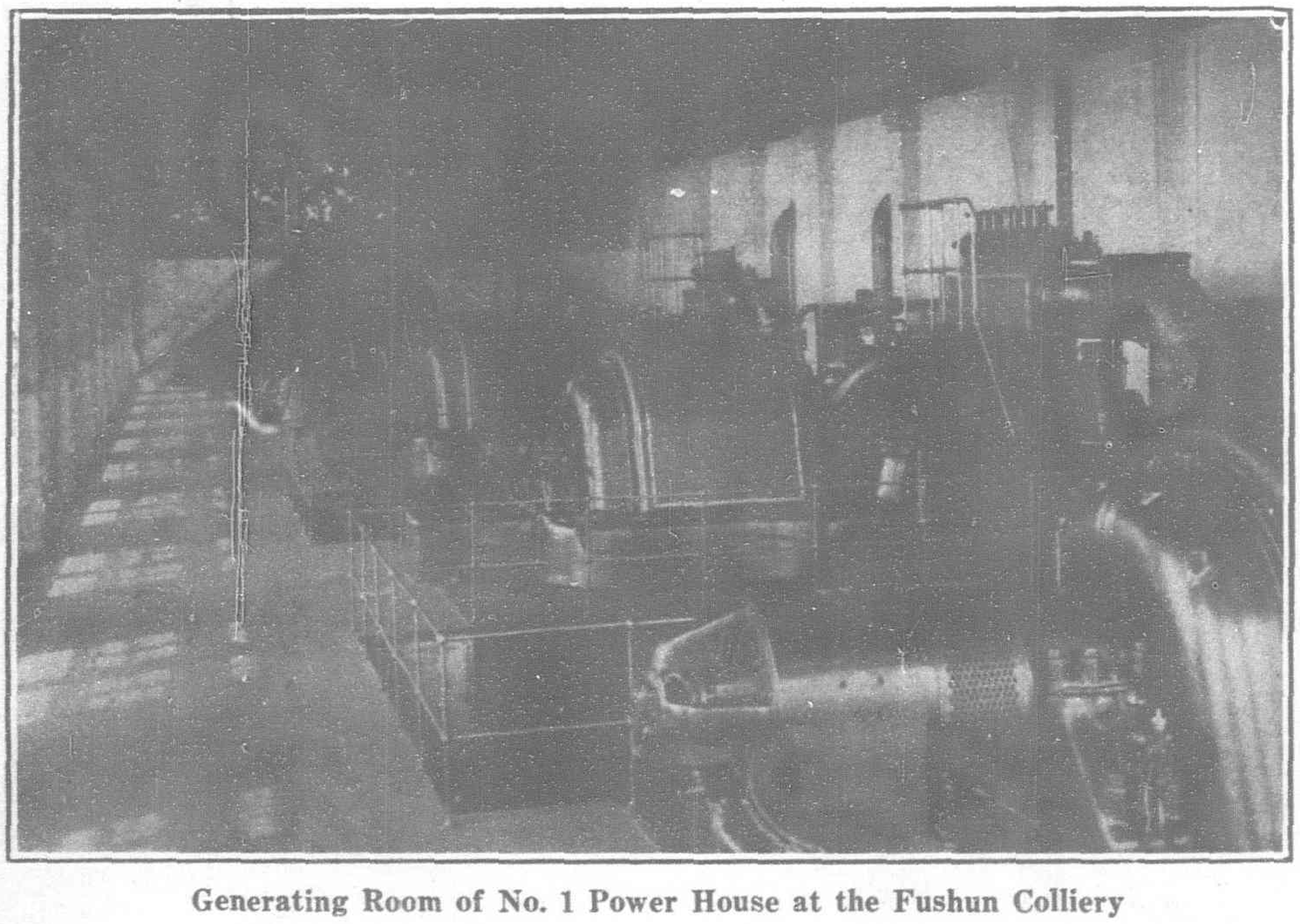
At present, the Company has 9 sub-stations which are inter-connected and provided with protective and safety devices to insure safety to apparatus and continuity of operation.

Sub-Stations

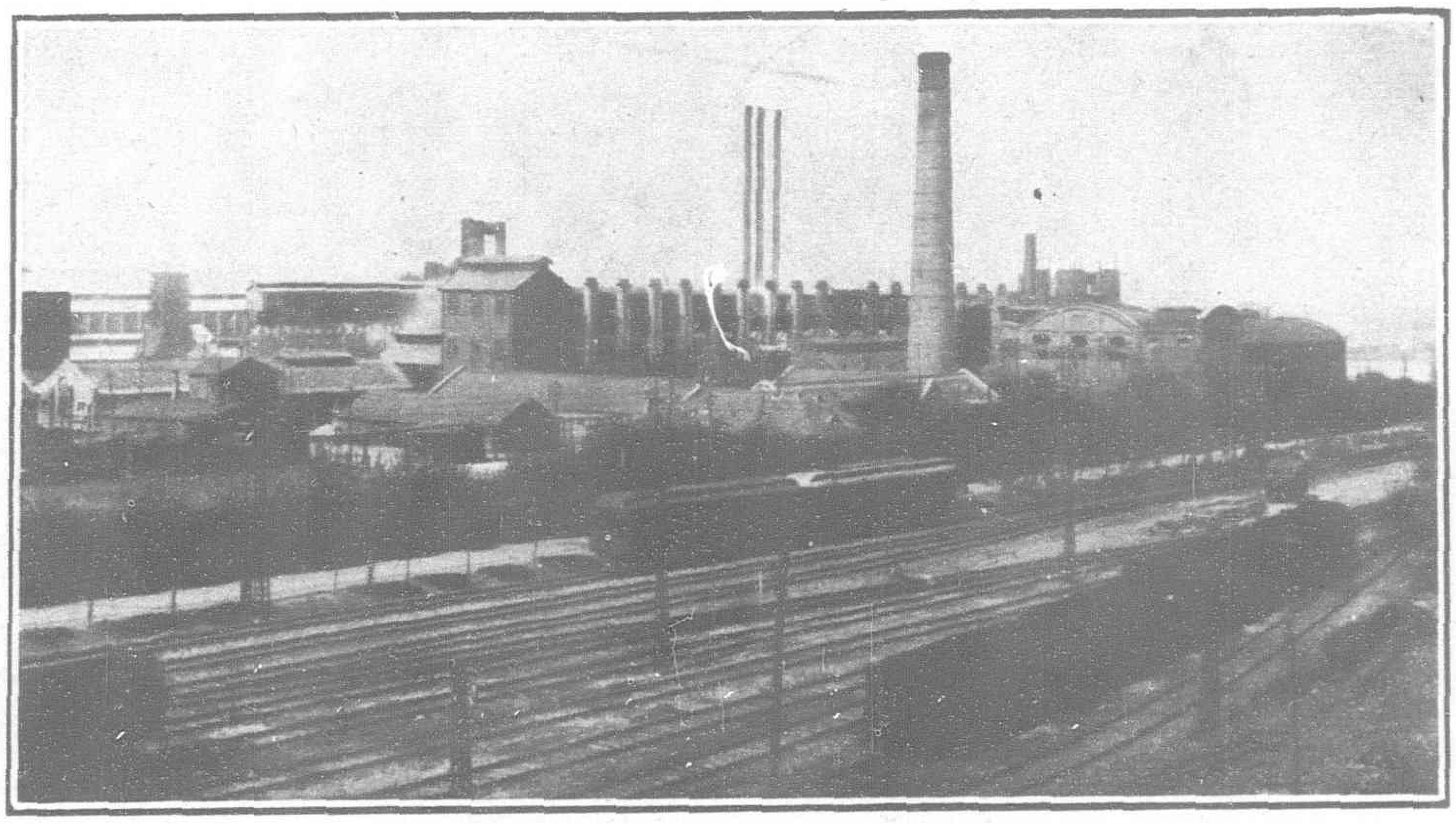
The following is the list of sub-stations operated by this Company:

Sub-stations	Installation	Operating transformer capacity k.v.a.	Makers
Jinjaura	Single phase, outdoor	4,500	Shibaura
Shikishima-hiroba	ditto, indoor	6,000	Yasukawa
Dafangshen	ditto, outdoor	450	Mitsubishi
Choushuitze	ditto, ditto	120	Fusi E.Mfg.Co.
Moukden	ditto, indoor	6,000	Mitsubishi and Osaka Dento
Fushun	ditto, ditto,	9,000	Yasukawa
Liaoyang	Three phase, outdoor	3,750	ditto
Yentai (nr. R. Station)	Single, ditto	765	Mitsubishi
ditto (nr. Colliery)	ditto ditto	750	ditto

Total length of aerial transmission lines owned by the Company is approximately 175 miles. Wooden poles are exclusively used for 3,300 and 11,000 volt lines, while for 44,000 volts, steel towers and poles are used. The Company's distribution system consists of about 522 miles of aerial lines, 24, 205 poles and 2,878 pole transformers.



Generating Room of No. 1 Power House at the Fushun Colliery



Exterior of No. 1 Power House at the Fushun Colliery

Electric Tramways

The electric tramway system in Dairen and its suburbs are also operated by the South Manchuria Electric Company. At present, the Company has 100 cars, including single and Bogie type, 9 freight cars and 2 watersprinkling cars. There are 33, 198 kilo meters of track, of which 4,898.5 meters are single and 28,299.5 double. In addition, there are 3,112 meters of track used as sidings. The number of passengers carried in the year ending June, 1928 was 24,729,004 with revenues of Y. 1,061,839.00

Motor Bus Transportation

Mention may also be made of the motor business operated by the Company. Formerly three services were operated, namely, Ryojun (Port Arthur), Shuishiying and the Ryojun-Dairen line. A service in the City of Dairen was opened at the beginning of April last. At present, the Company operates 28 motor buses including 5 International (each with an accommodation for 20 passengers) and 10 Chevrolet (each with an accommodation of 24 passengers).

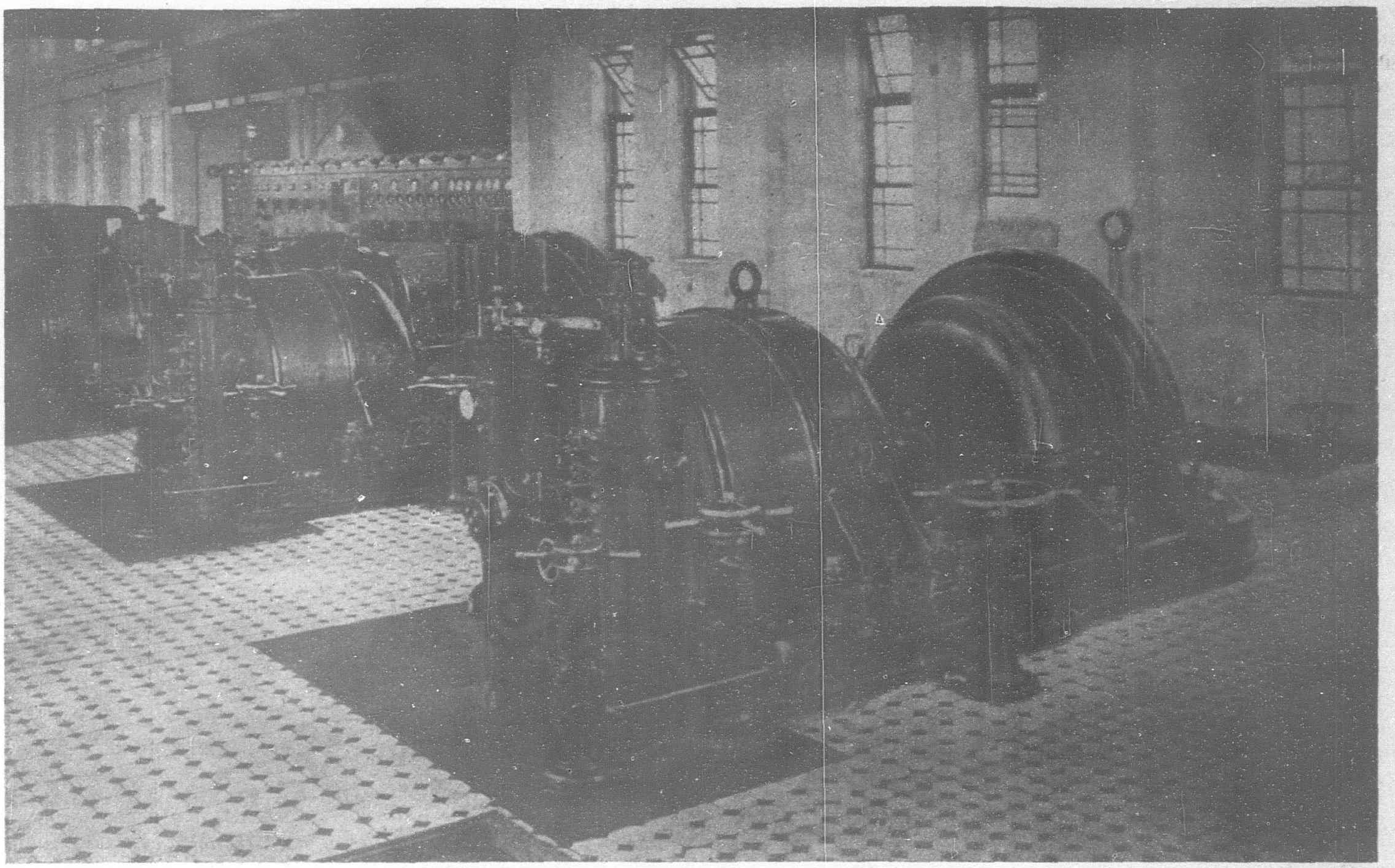
Affiliated Companies

In South Manchuria there are 9 electric companies affiliated with and managed by the South Manchuria Electric Co., Ltd. These plants were all erected by the S.M.R. and operated by its electrical department up to 1925, when independent companies were organized to take them over. Although the S.M.R. holds a controlling interest, the other shares are largely in the hands of Chinese.

Name of Company	Amount of Paid up Capital
Wafangtien Electric Light Co. Ltd.	Y.37,500
Tashihchiao Electric Light Co. Ltd.	37,500
Liaoyang Electric Light Co. Ltd.	200,000
Tiehling Electric Bureau	150,000
Manchuria Electric Co. Ltd.	237,000
Ssupingkai Electric Light Co. Ltd.	125,000
Kungchuling Electric Light Co. Ltd.	100,000
Fanchiatun Electric Co. Ltd.	25,000
Liaoyuen Huashing Electric Co. Ltd.	133,600

With these various undertakings under its management, the South Manchuria Electric Co. Ltd. is showing good results. The gross income of the Company in the latter part of 1927 was Y. 4.125,536.21 and gross expenditure, Y. 3,263,777.26, leaving a balance of Y. 861,758.54 as profit for the half year.

The above mentioned affiliated companies are also doing well The Liaoyang Electric Light Company has never distributed less than ten per cent in dividends and at present has a reserve fund and other properties considerably in excess

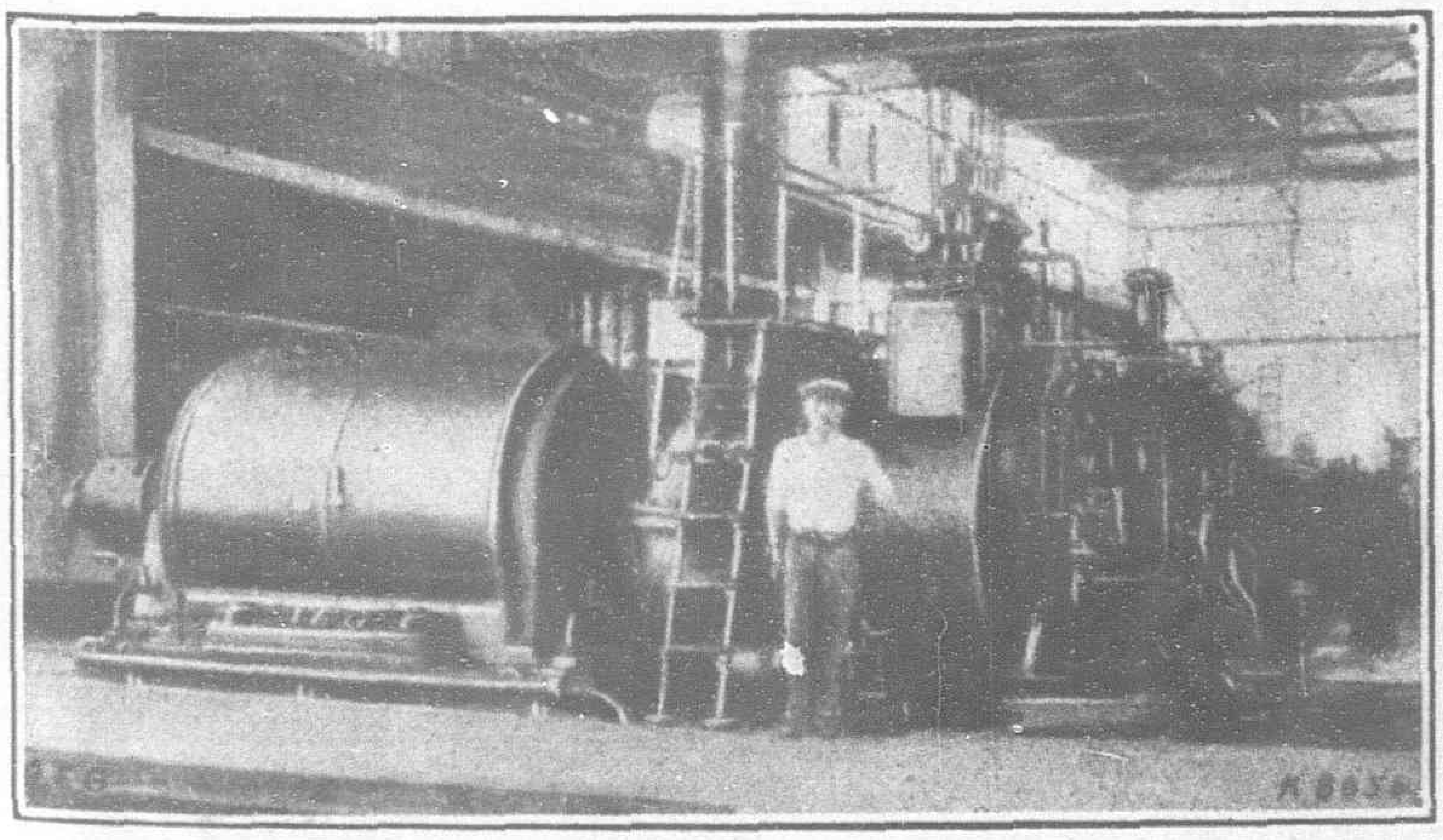


Power House of the Penchihu Coal and Iron Works

of its capital. The Chinese shareholders are demanding that this melon be sliced at once somewhat to the embarassment of the Japanese managing company which is looking ahead to the time when extensions to the plant will be necessary.

Fushun Power Plants

The major electrical developments in South Manchuria are intimately associated with the expansion of the industrial enterprises being carried forward by the Railway Company. The oil shale and other manufacturing plants being erected at the Fushun Colliery, combined with the electrification of the Open Cut Working and extending the transportation lines, call for additions that will double the present power house capacity within the next year. The Mine authorities have decided to concentrate the power output for all their requirements at the new No. 3 Power House, holding the older and smaller No. 2 plant operated in connection with the Mond Gas Producer plant as a reserve unit. The equipment of No. 2 and the original equipment of No. 3 Power Houses have been fully described and illustrated in previous issues of "The Far Eastern Review."



Generating Room of the Penshihu Power Station, Showing the New 3,700 k.w. A. E. G. Turbo-Alternator Set

The original No. 3 Fushun Power House was equipped with one 12,500 k.w. G.E-Curties turbo-alternator and two Babcock & Wilcox boilers, fed by pulverized coal from a Holbeck plant. The plant has since been increased by the addition of another 5,000 k.w. G.E.-Curties turbo-alternator and one 15,600 k.v.a. Siemens-Schuchardt alternator driven by a 12,500 k.w. Mitsubishi turbine. The boiler house capacity has also been enlarged by the addition of two B & W boilers fitted with chain grate stokers and two Mitsubishi boilers using pulverized coal as fuel. The demand for power created by electrifying the Open Cut Workings and the operation of the shale oil plant and other activities, will necessitate the installation of additional equipment to No. 3 Power House, which, we understand will take the form of a single unit of 20,000 or 25,000 k.w. The present capacity of the Fushun power houses is 39,000 k.w. distributed as follows;

Use of the Colliery	12.36 per cent
All Colliery Power purposes	57.21 ,,
Electric Railway Motors	7.43 ,,
Electric Lighting	6.40 ,,
Transmission to Mukden	12.52 ,,
Other purposes	4.09 ,,

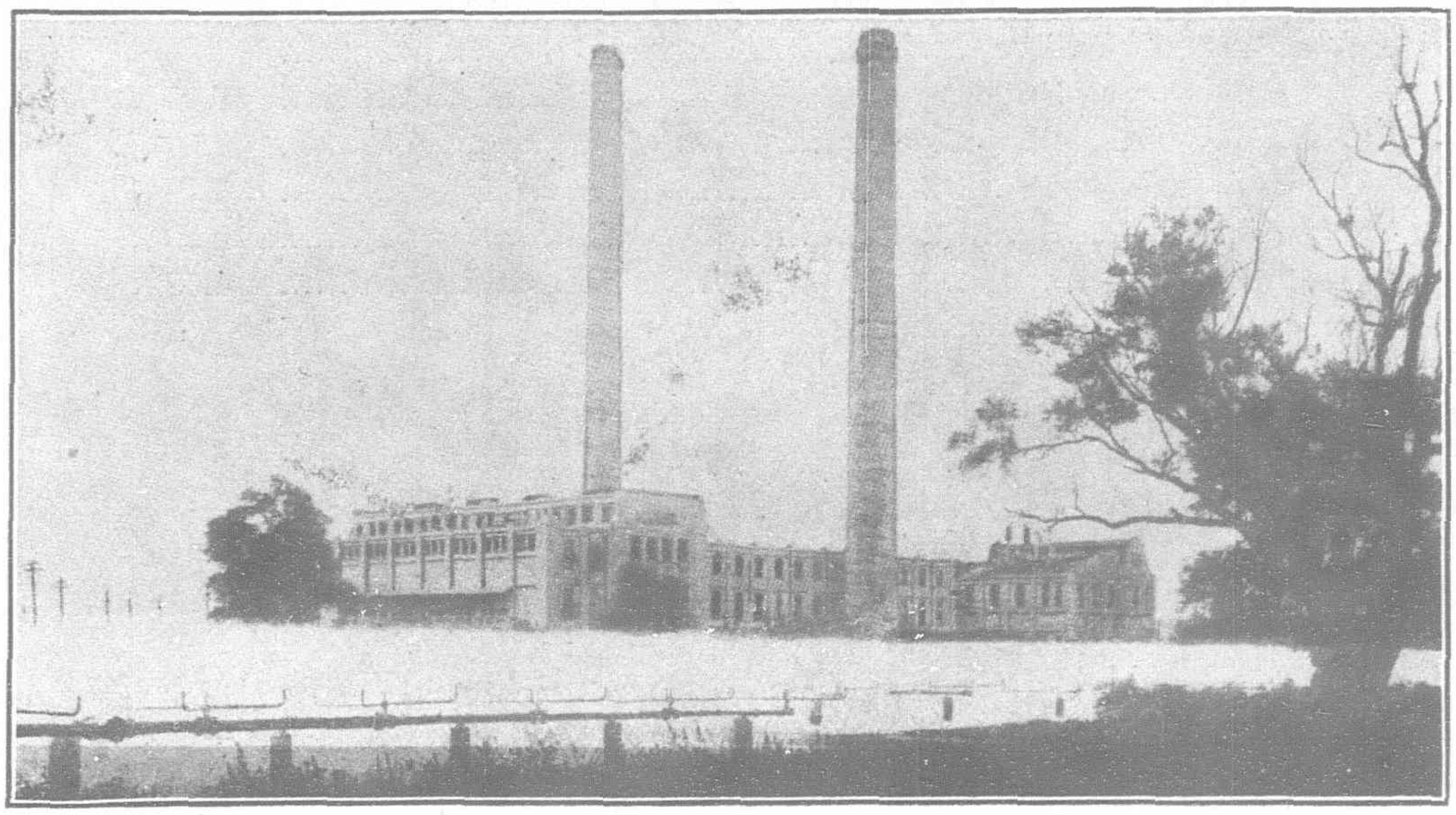
Surplus current has been transmitted over high powered lines to Mukden since 1922 and to Liaoyang since 1924.

Anshan Power House

A similar but larger power house development will take place at the Anshan Iron & Steel Works to take care of the new 500 ton blast furnace installation and the new steel mill. The present Anshan Power House is equipped with two Westinghouse 3,750 k.v.a. and two Brown, Boveri, k.v.a. turbo-alternators, a total of 35,500 k.v.a. There are four Babcock & Wilcox boilers, two of which burn waste gas and the other two, pulverized coal from a Holbeck plant. The costs for power house equipment included in the estimates for the new 500 ton blast furnace and steel mill call for Y.4,200,000. This figure is exclusive of the costs of motors for individual mechanical drives and for transportation. Only one electric locomotive of the Fushun type (made at the S.M.R. Shakako Works) is now in use at Anshan, but the development program provides for the complete electrification of the entire transportation system within the company's properties.

Power Hook-up of S.M.E. System

The South Manchuria Electricity Company has developed a plan to extend its activities and unify the electric system along the lines of the South Manchuria Railway. A new power house is to be erected during the current fiscal year at Kouchiatien on the S.M.R. main line north of Ssupingkai, and the Amanogawa Power Station at Dairen is to be enlarged. The company also proposes to purchase the power transmission line between Dairen and Chinchow owned by the Kwangtung Government so as to unify control of the Dairen-Pulantien power supply. It has also concluded an agreement whereby the town of New Wiju in Korea across the river from Antung will be supplied with power from its plant in the latter city.



No. 3 Power House at Fushun

The plan for unification of the power supply system along the S.M.R. lines is to embrace. First, with the Fushun Power House as a base, a transmission line will extend to Mukden, Anshan and Haichong, another between Mukden and Penshihu and a third from Mukden to Tiehling. Second, from the Antung power house, current will be transmitted to New Wiju as indicated above and extended to the next station on the Chosen Railway, while another transmission line will supply the towns along the Antung-Mukden Railway as far as Penshihu. Third, from the Changchun Power House, a transmission line will book up with the Fushun system at Tiehling taking in Kungchuling, Kuochiatien, Ssupingkai, Changtu and Kaiyuan. Fourth, from the Dairen Power house a transmission line will be erected along the Dairen-Port Arthur highway, while the Dairen-Pulantien line will be extended northwards to Haichong, hooking up with the Fushun system. Fifth, from the Yinkow power plant a transmission line will connect with Tachihchiao and the Dairen-Haichong system. When this hook up of all the power plants is completed covering every station along the S.M.R. system, all the wayside stations in South Manchuria will be supplied with light and power.

Port Arthur Plant Abolished

The plan to transmit from Dairen to Port Arthur involves the supply of 3,500,000 kilowatts. Arrangements have been made between the S.M. Electricity Company and the Kwantung Government whereby the entire supply of light and power for the city is to be supplied by the S.M.E. Company's plant at Dairen. A new sub-station is being erected in Port Arthur and the existing power house operated by the government will be closed down. This equipment consists of two generators, one of 1,500 k.w. and the other of 500 k.w.

It is expected that the new Dairen-Port Arthur highway will open up many new residential sections. At the same time, it is planned to discontinue the Dairen-Port Arthur passenger train service on the S.M.R. and connect the two cities with an electric tramway. The power to meet the demand from Port Arthur and operate the proposed tramway, will be supplied from the Amanogawa Plant.

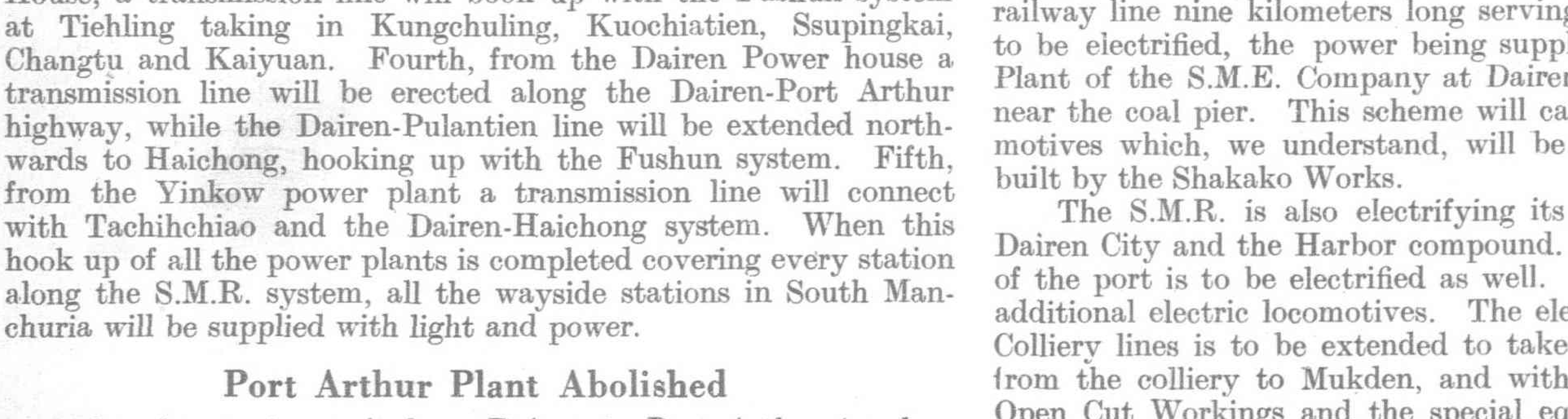
S.M.R. Electrification Schemes

In addition to the activities of the S.M. Electricity Company outlined above, other important electrification schemes are being carried out by the Railway company. The article describing the Kanchingtzu Coal Wharf in this issue mentions that the branch railway line nine kilometers long serving the coal storage yard, is to be electrified, the power being supplied from the Amanogawa Plant of the S.M.E. Company at Dairen with a sub-station at or near the coal pier. This scheme will call for several electric locomotives which, we understand, will be of the Fushun type and built by the Shakako Works.

The S.M.R. is also electrifying its lines within the limits of Dairen City and the Harbor compound. All the mechanical work of the port is to be electrified as well. This will call for several additional electric locomotives. The electrification of the Fushun Colliery lines is to be extended to take in the entire branch line from the colliery to Mukden, and with the electrification of the Open Cut Workings and the special equipment for handling the shale from the pit to the shale oil plant, the scheme will call for considerable additions to the present plant.

Yalu River Hydro-Electric Power

No mention of the electrical activities of the S.M.R. would be complete without some reference to the studies being carried out for deriving power from the Yalu River. Investigations have been made in progress for the past three years at Seisuiri (about 60 miles above Antung) and data concerning the volume and head of water carefully recorded. Further studies are taking place at Igen, 50 miles above Seisuiri, and at other points. Various experts from Japan have visited the region and checked up the S.M.R. reports.



Transporting a Worthington Surface Condenser from the Railway to the Mukden Power Station

The Railway Company is not immediately concerned about any increase in its sources of power, as it has in contemplation an extensive use of pulverized coal for operating the railway and industries which will take care of its requirements economically during the life-time of the Fushun mines. However, the Japanese authorities are looking a long way into the future and visualize the time when the Fushun mines may not be so profitable or easy to work as they are now, when other sources of power will have to be found to maintain the efficiency of the railway. The Yalu River, forming the boundary between China and Korea, is a possible source of considerable electric power, but whatever is done to develop it must meet with the consent and co-operation of the Chinese who enjoy equal rights in the river.

Notwithstanding the political aspects of the problem, the Japanese are proceeding carefully on their side of the river with minute investigations and studies, acquiring all the necessary data on which to formulate their ultimate decision as to the availability of the river as a source of commercial power. The river has such a wide margin between high and low water levels that it complicates any proposition for utilizing its lower reaches. Full particulars of the data and studies already made have been published in Japanese in the Journal of the Manchuria Engineers' Association, but as these are incomplete, we can limit our remarks to the conclusions arriveed at by hydro-electric experts from Japan who have investigated the proposition on the ground. Technically, there is no reason why ample hydro-electric power can not be generated along the Yalu River, but to make the enterprise profitable, at least 100,000 k.w. would have to be developed and a market found for the power. This demand does not exist at present either in Manchuria or in Korea and, until the towns and cities expand sufficiently to require this amount of power, it is hopeless to expect any large development along the lines indicated.

Penshihu Power Plant

In the February 1925 number of "The Far Eastern Review" appeared a detailed description of the plant of the Penshihu Coal & Iron Works. The Penshihu power plant not only supplies the requirements of the mines and blast furnaces of the company, but lights the towns of Penshihu, Kiaotao and Nanfen. The original plant consisted of two 1,500 k.w. A.E.G. turbo-alternators. During the war an additional 2,500 k.w. General Electric turbo-alternator was installed and in 1925 its capacity was again increased by an additional A.E.G. turbo-alternator. This last is a standard A.E.G. condensing turbine, running at 3,600 r.p.m. generating 3,750 k.w. at 60 cycles. The machine is provided with the usual automatic nozzle regulation, the roton consists of a double row Curtis wheel and six impulse wheels in which the steam is expanded down to vacuum. This design shows only a slight decrease in efficiency from full-load to half-load.

Mukden Power Plant

The Mukden Government Electric Light Works is the principal Chinese owned power plant in Manchuria. Formerly there was a plant for supplying the Japanese railway town operated by the S.M.R., but this was discontinued when the transmission line from the Fushun Power Station was extended to Mukden. The Mukden Government plant supplies light and power to the Chinese city and its suburbs. Practically all of the equipment is of American manufacture supplied by Andersen, Meyer & Company. The initial installation of 1,500 k.w. was made in 1920, the steam turbine and generator being supplied by the International General Electric Co. The 5,000 sq. ft. Worthington condenser with auxiliaries was designed for a steam consumption of 15.1 lbs. per k.w. hr. operating with an absolute exhaust back pressure of two inches absolute. A wet vacuum pump of the Edwards suction valveless type and a closed feed-water heater were also included.

Although of comparatively small size, the handling of this equipment from the railroad siding to the plant site involved a transportation problem of considerable magnitude.

No sooner had the original plant been put in operation than the rapid increase in demand for electric power necessitated an extension of facilities. A second order was placed with Worthington in 1922 for a 6,325 square foot surface condenser and auxiliaries to be used in connection with a 2,500 k.w. General Electric steam turbo-generator having a steam consumption of 14.6 pounds per kw. hour operating with two inches absolute back pressure.

Again, in 1927, industrial progress resulting from the development of Manchuria's great resources, necessitated a second extension greater in capacity than the original plant plus the first extension. This new plant is rated at 5,000 k.w. and is laid out on the most modern lines as may be judged from the steam consumption at full load of 10.6 lbs. per k.w. hours.

A large part of the improvement in the economy of this second extension over the performance of the preceding installation is attributed to the increase in boiler pressure from 175 lbs. to 300 lbs. Then too, instead of the wet vacuum pump, Worthington supplied a two stage centrifugal condensate pump and a steam jet air ejector having a jet inner cooler and surface after-cooler. The Worthington surface condenser is of the two pass type having 7,800 sq. ft. of cooling surface, and, as formerly, operating with two inches absolute back pressure.

Harbin Power Houses

A recent report on the electric light situation in Harbin states that there are 28 public and private lighting plants in the city, Five plants are actively competing against each other for public business. The North Manchuria Electricity Company is serving 66,000 lamps: the Tienyeh Kungssu, 12,000: Fuchiaten Tienyeh, Kungssu, 60,000: the Chinese Eastern Railway Workshops, 30,000 and the Sungari Flour Mill, 15,000.

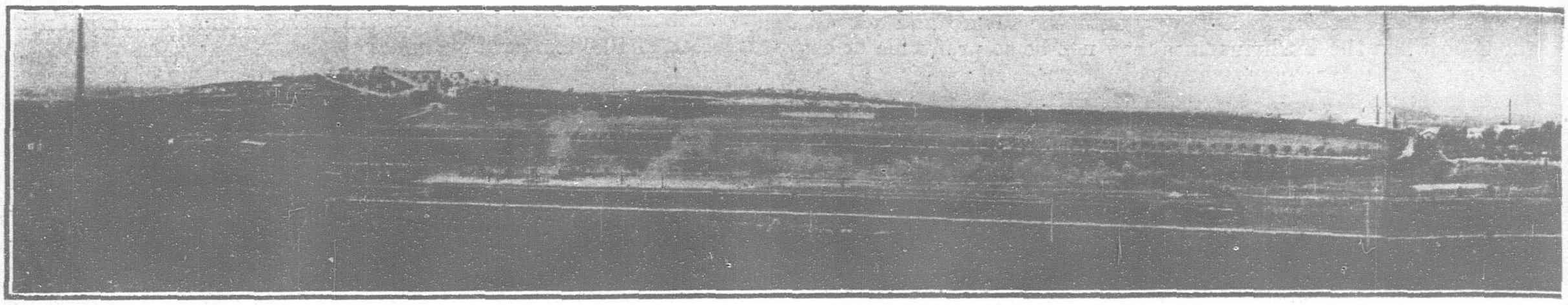
The territory is divided as follows: Pristan is served by the North Manchuria and the Sungari Flour Mill plants: Tienyeh is serving New Town: the C.E.R. Workshops, the Railway staff's residences: and Fuchiatien by the Fuchiatien Tienyeh Kungssu. The so-called 8th or Industrial District, is being competed for by the North Manchuria and the Tienyeh companies.

There is also the power plant for the Harbin Tramways which operates 10 miles of lines. The electric equipment, 3,000 k.w. and the cars were supplied by German firms but the boilers, engines and pumps came from British makers.

The North Manchuria and Fuchiatien companies are to install an additions 1,500 k.w. generator each. It is also reported that a new power house of 2,000 k.w. capacity is to be erected at Fuchiatien. The C.E.R. Workshops is also planning to increase its capacity by an additional 1,500 k.w. generator. The competition for business amongst the electric companies of Harbin must eventually result in a combination of interests and the erection of one central power house.

Aircraft Carriers in Japan

THE outstanding events of 1928 were the completion of the large aircraft carriers "Akagi" and "Kaga," the former of 28,100 tons and 28.5 knots, the latter of 28,000 tons and 23 knots. Both were laid down as capital ships, their conversion being due to the Washington Treaty. The "Akagi," which closely resembles H.M.S. "Furious," measures 763ft. between perpendiculars and has an extreme breadth of 92ft. She carries the very powerful armament of ten 8in. and sixteen 4.7in. guns, the heavy weapons being mounted on the broadside in turrets or casemates. The "Kaga" is 715ft. long, with a beam of 103ft., and has the same armament as "Akagi." Each ship can accommodate about sixty aircraft. Although Japan began building 10,000-ton cruisers in 1924, her first ship of this type, the "Nachi," was only completed in October, 1928. The "Myoko," launched April 16, 1927, is running her trials; the "Haguro" and the "Ashigara" went afloat respectively on March 24 and May 22, 1928. All four ships are identical:—Length between perpendiculars, 630ft.; breadth, 57ft.; draught, 16½ft.; standard displacement, 10,000 tons; geared turbines of 130,000 S.H.P. are installed for a maximum speed of 33 knots; the main armament of ten 8in. guns is mounted in twin turrets on the center line, three forward and two aft. There are also four 4.7in. A.A. guns and twelve torpedo tubes. Two seaplanes are carried. These are the most strongly armed and elaborately equipped cruisers at present afloat. The arrangement of the turrets, massive bridgework, and three sharply raking funnels — the first two trunked together—give the ships an extraordinary appearance. They are credited with triple hulls and extensive armour protection, but it is difficult to believe that so many features could be worked into a hull of 10,000 tons. Four more cruisers of this class are under construction.



Panoramic View of the Anshan

New Steel Mill for Manchuria

Development of the Low Grade Iron Deposits at Ashan into a Profitable Pig Iron and Steel Industry; A Triumph for Japanese Engineering

THE development of the low grade iron deposits of Anshan into an undertaking that within the next year will be turning out over 200,000 tons of steel products is an achievement which reflects the highest credit on the technical ability and perseverance of Japan's engineers and the business enterprise of the South Manchuria Railway Company.

The Anshan iron deposits were discovered in 1909 by the geologists of the South Manchuria Railway Company. A site of about 4,540 acres was subsequently purchased from the Chinese on which to erect a blast furnace plant and lay out a town for residential purposes. The war compelled Japan to develop every available iron deposit under her own control and extend her investments to China. Although the Anshan deposits consists of ores averaging 35 to 40 per cent. of iron, she erected two blast furnaces in order to obtain the war materials which would enable her to carry through her part in the conflict. Japan was late in getting started in Anshan and the first pig iron was not produced until 1919. With the termination of the war and the slump in iron prices, the Anshan plant became somewhat of a white elephant on the hands of the S.M.R. since the war, the plant has been operated at a yearly loss, reaching at times to over Y.3,000,000, a heavy drain on the finances of the Railway Company. It became increasingly evident that in order to save the original investment some economical method would have to be found to utilize the low grade ores. The S.M.R. officials turned to the United States for technical assistance and advice and in May, 1921, engaged a commission of American engineers and geologists to investigate and report on the iron ore deposits of Anshan and the coal deposits of Fushan. This commission, consisting of W. R. Appleby, W. H. Enmons, W. J. Mead, F. Hutchinson, L. D. Davenport and W. H. Crago, carried out an exhaustive examination of both properties in 1921 and laid down a plan for their working and development. Although some modifications have since been made in the program outlined by the commission, its main features have been adhered to.

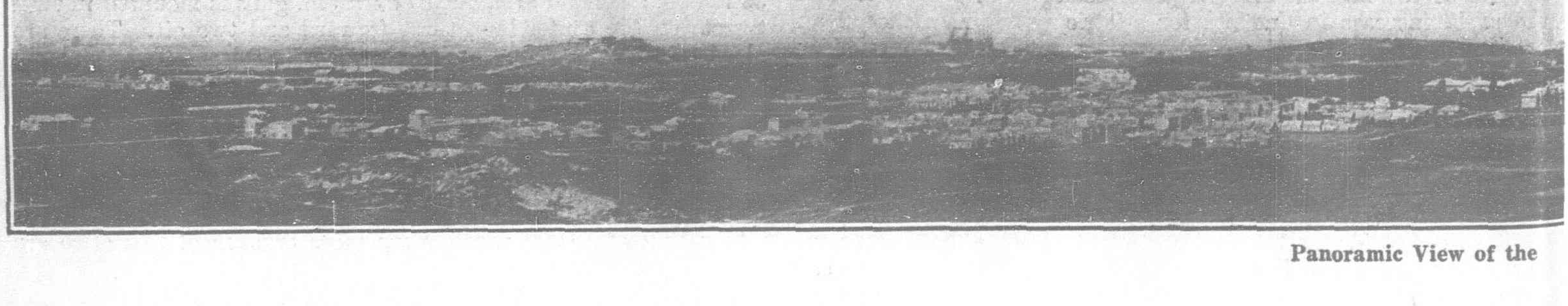
The most important problem connected with the successful working of the Anshan mines was to devise some economical method of reducing the low grade hemitite ores to magnetite and concentrating them for more efficient blast furnace use. Here the credit for what has been accomplished must go to the Japanese engineer in charge of the work, Mr. T. Umene. As in the case of the oil shale retort at Fushun, the Japanese engineers were not satisfied with the results obtained from the cylindrical type of reduction furnace used in other countries and they set about to develop a new type that would better meet the peculiar conditions under which they had to operate. Several experimental reduction furnaces were erected and tested on the ground and eventually a new type was perfected under Mr. Umene's direction which gave such satisfactory results that the construction of a full sized working unit was decided upon.

This furnace, illustrated in the accompanying plans was erected in 1923 and subjected to continuous working tests over periods of months before a satisfactory working formula was evolved. The inside dimensions of the furnace are 2 m. wide, 6 m. long and 10 m. high.

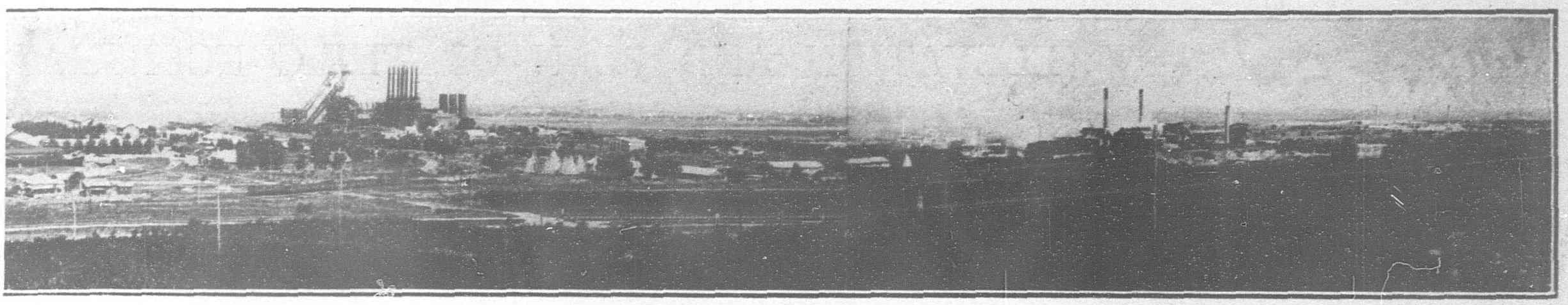
Particulars

A.—Outside frame of iron plate. *B.*—Fire Brick lining. The furnace sides have an inclination of 88 degrees to facilitate discharging. *C.*—Gas combustion chamber. There are seven gas feeds on each side of the furnace and one at each end. *D.*—Gas inlets into furnace, corresponding to the number of the feed inlets. *E.*—Ore charging doors; three on one side and four on the other. *F.*—Inlet of reducing gas from the bottom. This "effusion battery" is divided into six sections, each having their own gas pipes leading in from the outside main, permitting free regulation from the outside. *G.*—Rollers for regulating the discharge of the reduced ore. Both sides of the furnace are equipped with two rollers whose speed regulates the quantity of reduced ore discharged into the conveyor. *H.*—Discharging apron. *I.*—Conveying belts on both sides of furnace for carrying away reduced ore. *J.*—Water tank or chamber to prevent entrance of air into the furnace. *K.*—Waste gas discharge pipes. *L.*—Manholes. *M.*—Iron cover for preventing air entering furnace through rollers. *N.*—Main gas pipe. *O.*—Electrically driven induced draught fan.

The daily reduction capacity of this size of furnace was found to be 300 tons, consuming about 50 cubic meters of gas per ton of



Panoramic View of the



Iron and Steel Works

ore reduced, the gas being supplied from the coke ovens of the Anshan Works. The furnace as shown in the accompanying plan had to be modified and perfected in several details connected with the refractory lining and changes in the combustion chamber. The following results were finally arrived at in a three months continuous test, from August 1 to the end of November, 1923.

(*a*)	Number of days	89 days
(*b*)	Quantity of ore processed	21,433 mg.
	Daily average	241 mg.
	Maximum	308 mg.
(*c*)	Quantity of gas consumed per mg. ..	59 cu. m.
	Maximum	50 cu. m.
(*d*)	Power used per mg.	1.84 k.w.h.
(*e*)	Water used per mg.	2.62 cu. m.
(*f*)	Temperature of Combustion chamber	900 C.
(*g*)	Induced draught	about 45 mm. (water column)

The report on the mining and concentration of the Anshan ores, submitted by the American technical commission in 1922, summarized the results obtained in the tests of the ores carried out at the Mines Testing Station at Minneapolis, outlined the results obtained in the laboratory set up at Anshan, advised the company as to the deposits most suitable for immediate attack, laid down tentative plans for mining and the general method of concentrating the ores. As the ores of East and West Anshan are nearly wholly non-magnetic they were eliminated from consideration and recommendations made to confine mining operations to the Otoen and Taikoshan deposits. The ore from the latter deposit is superior to the other Anshan ores, being principally magnetic and therefore more adapted for concentration. It was estimated that Taikoshan contained about 45,000,000 tons of reasonably probable ore, sufficient to supply the two 250 ton blast furnaces with 1,108,140 tons of crude ore for a period of 40 years. By concentrating mining operation on this deposit, a considerable saving of mining costs and overhead was made possible.

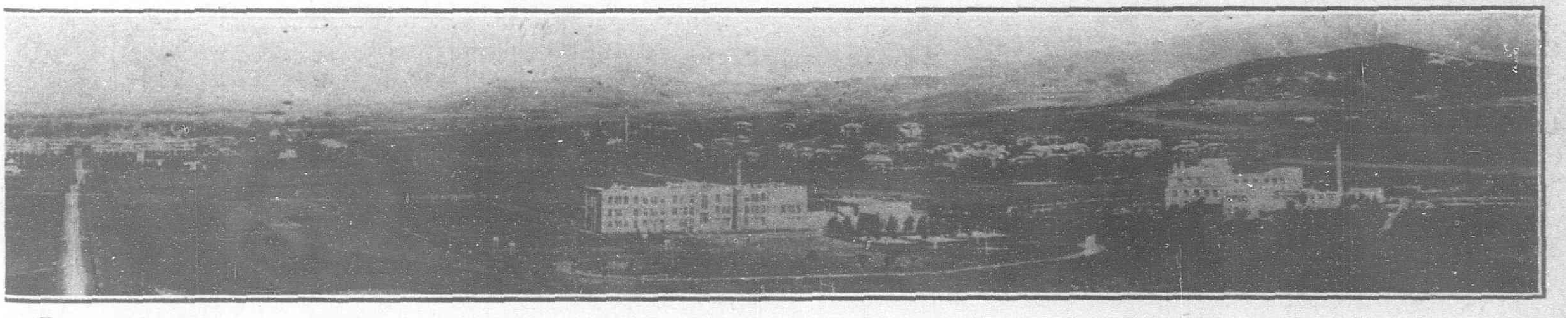
The Anshan officials have followed this advice and are now mining ore from this deposit exclusively. We were informed at Anshan that the Taikoshan deposit contained about 100,000,000 tons of commercial ore and that the total reserves of the 11 deposits owned by the company was over 400,000,000 tons of 35-40 per cent. ore. The configuration of the Taikoshan deposit lends itself admirably to its exploitation by means of open cut mining or quarrying as well as simple methods of hand-loading and mine transportation. The estimated cost of mining crude ore at this deposit is about Y.52 per ton. The illustration on page 78 of the Taikoshan mine gives a general idea of the system of mining employed. They also show the explosion of a six ton charge of high-powered Asano explosives which loosened 45,000 tons of ore. The largest blast employed on this deposit was 17 tons of Asano Carlit high explosive, displacing 140,000 tons of ore. The mining practice followed is to erect pockets at suitable points along the loading tracks. The ore is blasted down to a floor level with the tops of these pockets, loaded by hand into two ton mine cars and pushed by hand to the pockets. From these, the ore is loaded directly into standard gauge railway cars for transportation to the concentration plant at Anshan, eight miles distant.

The average of 417 samples of Taikoshan ores analyzed 37.57 per cent. metallic iron for the whole ore body, while a similar number of samples for the Otoen deposit showed only 31.02 per cent. metallic iron. Concentration of the Taikoshan ores produces an ore carrying 61-62 per cent. iron with a ratio of 2.57 tons of crude ore to one ton of concentrates.

The development program for working the mine provided for the erection of a concentration plant at a suitable location near the blast furnaces that would enable milling operations to be carried on efficiently and economically and allow for the disposal of the tailings by gravity over a period of 50 years. These conditions made it necessary to select a high elevation on which to build the mill and fortunately such a desirable site was available within the limits of the company's property about half a mile south of the blast furnaces. The illustrations accompanying this article show the general exterior view of the Feeding and Tailing sides of the Concentration plant and the plan shows the layout of the machinery and flow.

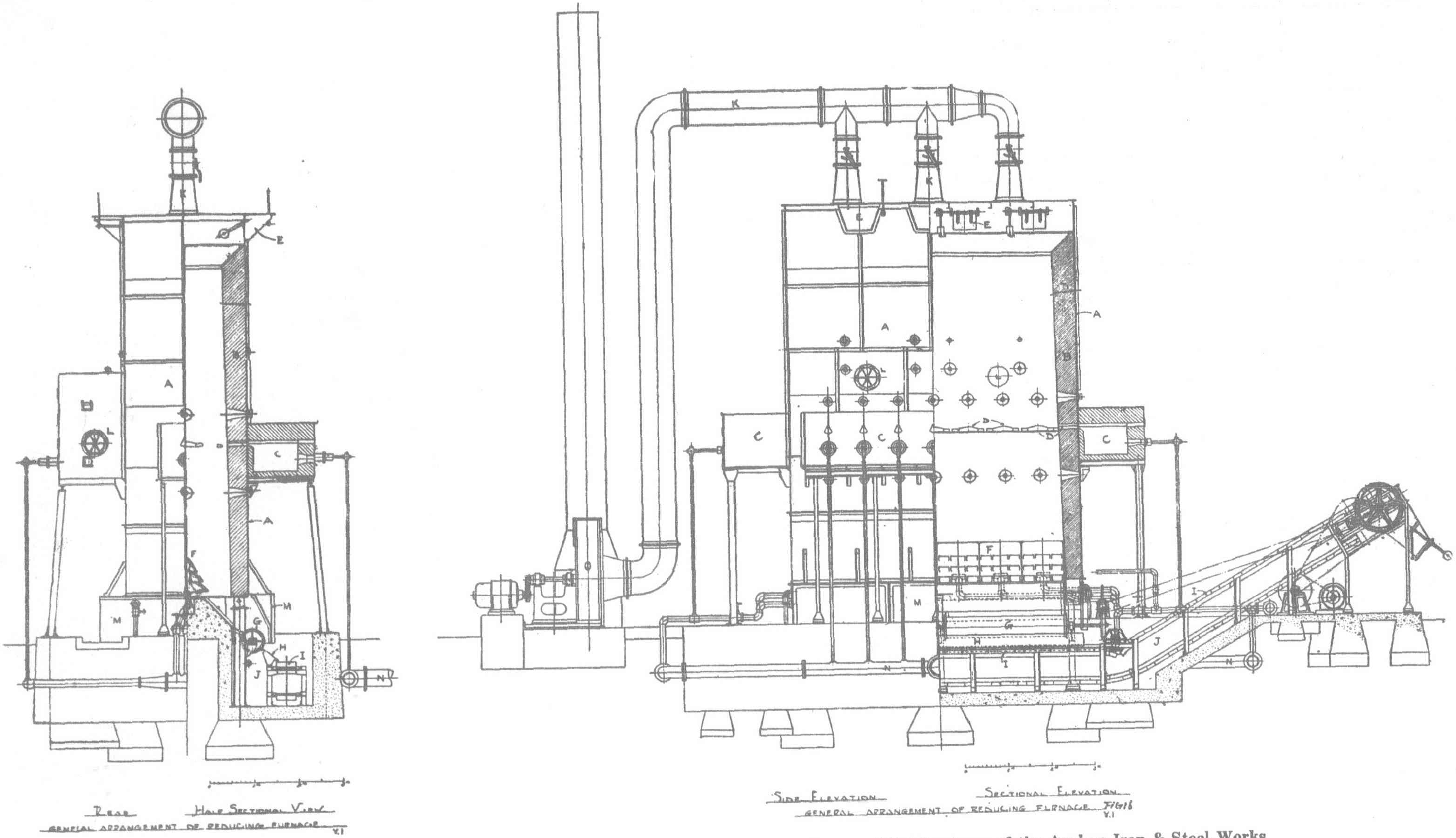
The recommendations of the American commission for the equipment of the plant have been carried out in actual practice with one notable addition. The American experts stated in their report that "in all probability the next twenty years will see the development of furnaces for the commercial roasting of hematite over to magnetities, thus bringing about the economical concentration of low grade non-magnetic iron ores." The Japanese engineers, however, could not wait twenty years for other experts to solve their immediate problem, so they went ahead and developed their own reduction furnace as described above and installed a battery of eight in the concentration plant. This invention or perfection of principles already in use, has made possible the commercial handling of the Anshan ores and the expansion of a moribund pig iron undertaking into a profitable modern steel industry.

The crude ore as it is delivered by the railway at the concentration plant goes first to the coarse crushers. This plant is equipped with four Traylor Bull Dog crushers capable of handling 6,000 tons of ore per day. From the crushers the ore is deposited in a storage yard from which it is elevated by belt conveyors to the feeding bins on top of the battery of eight Reduction Furnaces. After being roasted and converted into magnetite in the furnaces, the reduced ore passes to a battery of five Buchanan crushers for

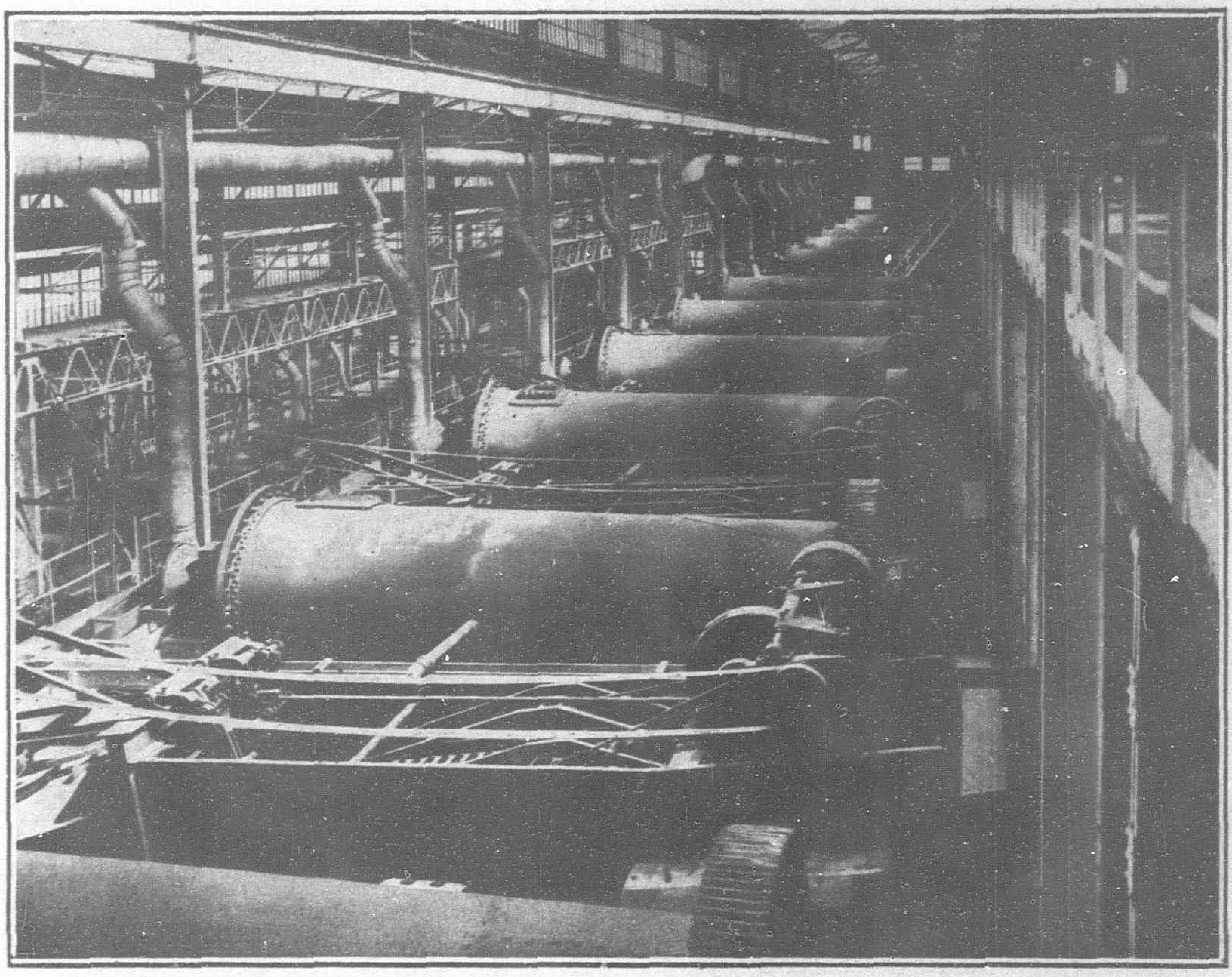


Town of Anshan

ELEVATION AND PLAN OF THE CONCENTRATION PLANT OF THE ANSHAN IRON & STEEL WORKS


Rear
Half Sectional View
General Arrangement of Reducing Furnace
Y.I
Side Elevation
Sectional Elevation
General Arrangement of Reducing Furnace FIG 16
Y.I
A
B
C
D
E
F
G
H
I
J
K
L
M
N

Sectional View and Side Elevation of Reduction Furnace Invented by Mr. T. Umene, Chief Engineer of the Anshan Iron & Steel Works fine crushing. These crushers, operated by Shibaura motors, crush the ore to about one-half inch size for the ball mills. There are six ball mills of Japanese manufacture discharging into a set of six mixers. From these, the flow passes on to the tube mills. The battery consists of 12 tube mills made by the Kobe Steel Works individually operated by Shibaura motors. In connection with the tube mills are 12 puddling mills supplied by the Dorr Company of London. From these, the flow passes on to a battery of 54 Grondal magnetic separators and then to four 30 feet diameter settling tanks. From these tanks the flow passes through eight Oliver Continuous Vacuum Filters, made in Oakland, California. After leaving the filters the fine concentrate is prepared for sintering by being carried along on a belt conveyor and mixed with fine coal and limestone. The tailings pass out to the dewatering tanks and the fine concentrates to storage bins ready for the sintering machines. There are five Dwight and Lloyd's continuous sintering machines which deliver the concentrated ore to the railway cars for transportation to the blast furnaces. The final tailings from the mill discharge into large thickening tanks or dewaters. Part of the water is recovered and reused in the mill, the tailings being carried by gravity to the tailing compound some distance away.



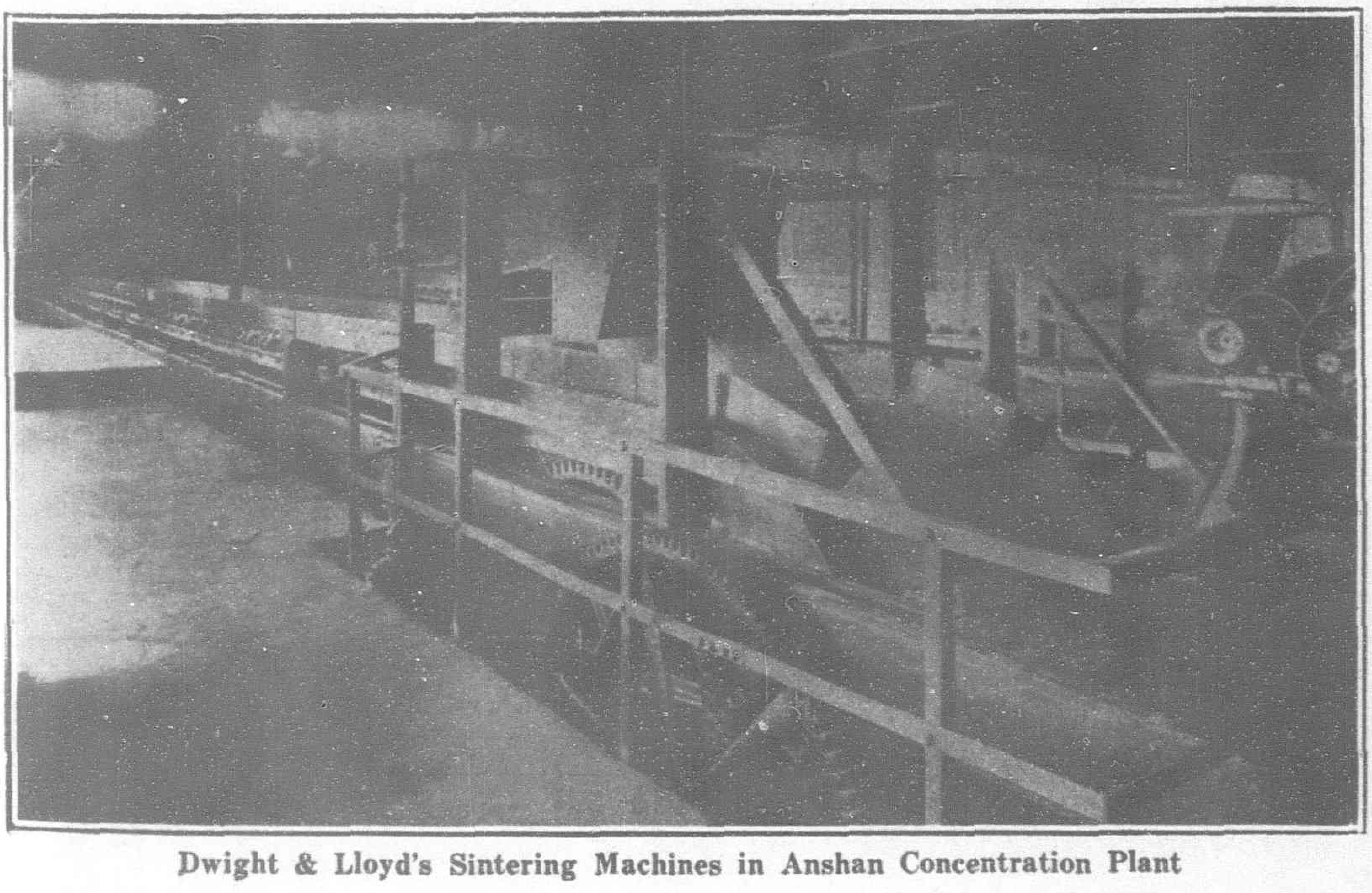
Tube Mill Battery in the Anshan Concentration Plant; Made by the Kobe Steel Works

The cost of producing a 62 per cent. sintered ore as estimated by the American commission was Y.6.90 per ton. Including the cost of mining at Y.1.50, the final cost as delivered at the blast furnaces is about Y.8.40 or $4.20 gold per ton, one half the average cost of American Old Range Bessemer ores delivered at the furnaces for the five year 1917-21.

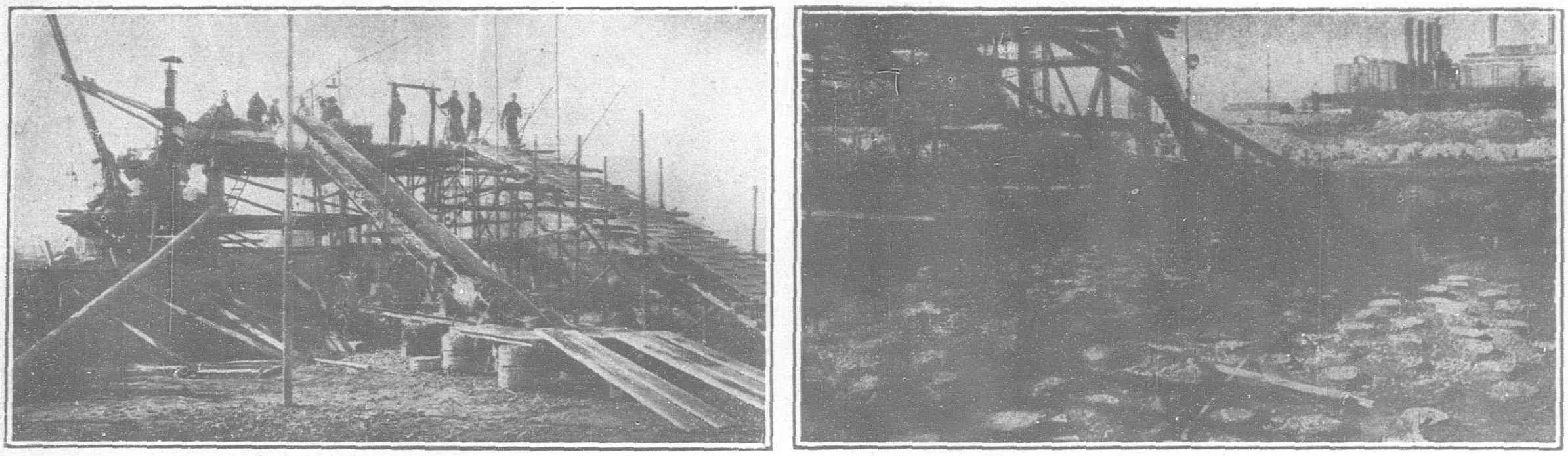
Before the erection of the reduction furnaces and concentration plant, the Anshan blast furnaces were working on selected high-grade ores from the various deposits, averaging about 50 per cent. metallic iron. By concentrating the ore to 60 per cent., the iron content is increased 10 per cent. or, 20 per cent. higher than the grade formerly used. The blast furnaces are therefore able to put out 20 per cent. more pig-iron in the same period. The original blast furnaces working with 50 per cent. ores were rated at 250 tons per day, but with the use of the 60 per cent. concentrated ore their capacity has been increased 20 per cent. to 300 tons per day. With pig iron at Y.40 per ton, the income per furnace is increased Y.2,000 per day, or Y.4,000 for the two, a total of Y.1,200,000 per working year of 300 days. The economy in operation is carried further, decreasing the amount of limestone and fuel, the quantity of slag and its cost of disposal and there is less difficulty in producing a uniformly good grade of pig iron.

The existing plant of the Anshan Iron & Steel Works consists of two 300 ton blast furnaces producing 200,000 tons of pig-iron per year. These furnaces were erected during the war and have since been taxed to their full capacity. One of the furnaces must undergo radical repairs this year and it is for this reason that the new 500 ton furnace is being erected. When this is completed and in operation, advantage will be taken of the opportunity to increase the capacity of the old furnaces to 350 tons per day each, giving a combined producing capacity of 360,000 tons per year. The new 500 ton furnace, however, is intended as a reserve unit in order to ensure a constant minimum output of 200,000 tons. When the new steel mill is erected, an additional 500 ton furnace will be installed, increasing the total producing capacity of the plant to 510,000 tons per year of 300 working days, assuring a constant output of 400,000 tons with one unit in reserve.

The new 500 ton furnace was designed by Mr. Kohlhaas, consulting engineer of Perrin, Marshall & Company of New York, who recently spent eight months at Anshan investigating all the branches of the proposed steel industry. Mr. Kohlhaas is admirably equipped to handle asiatic iron and steel problems, having designed the plant for the Tata Iron & Steel Works in India as well as the Lungyen furnace in North China. The actual construction of the new furnace was awarded to Japanese makers; the steel castings being supplied by the Sumitomo Steel Works of Osaka, the plate work by the Kawasaki Dockyard and other parts by the Dairen Engineering Works. The contract for the



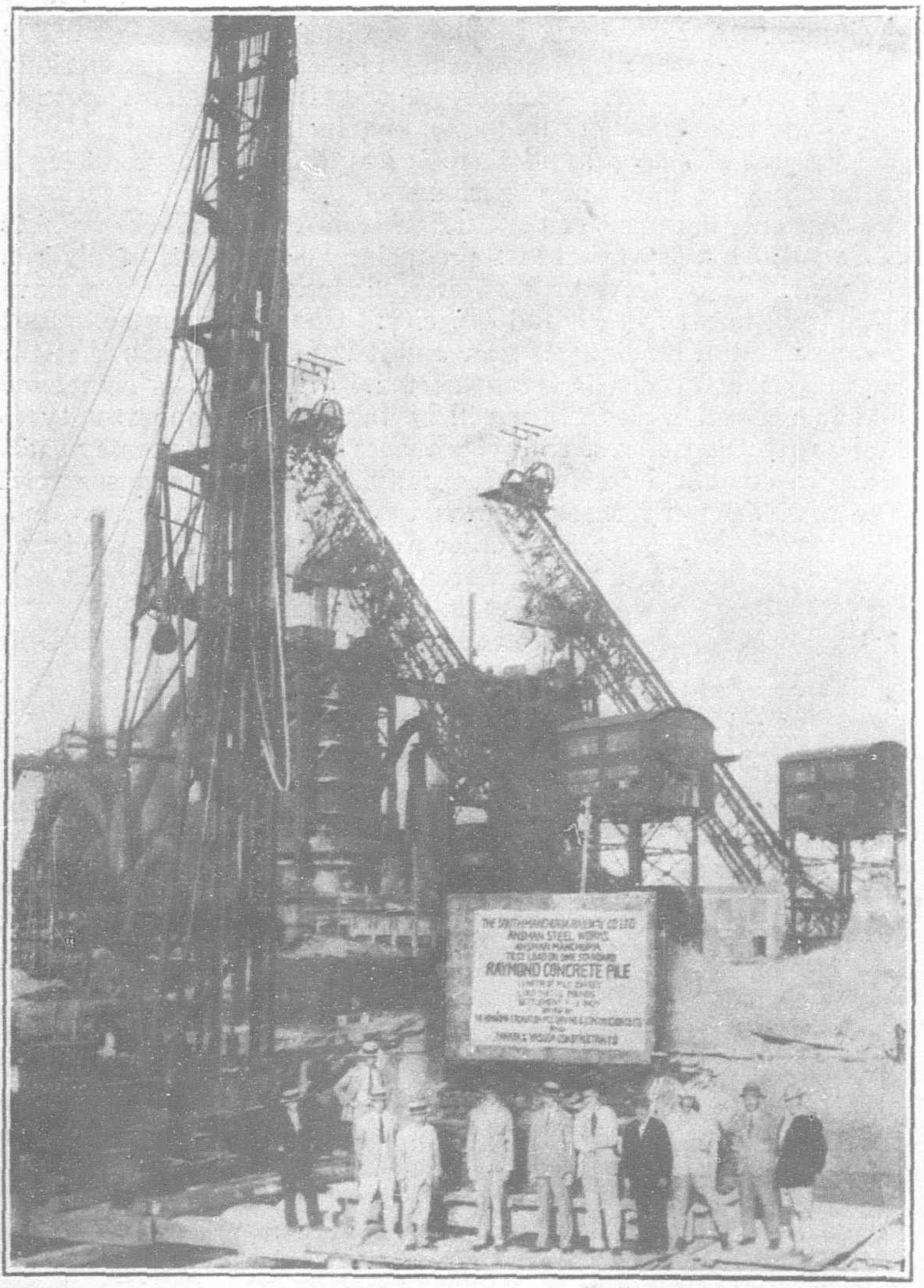
Dwight & Lloyd's Sintering Machines in Anshan Concentration Plant



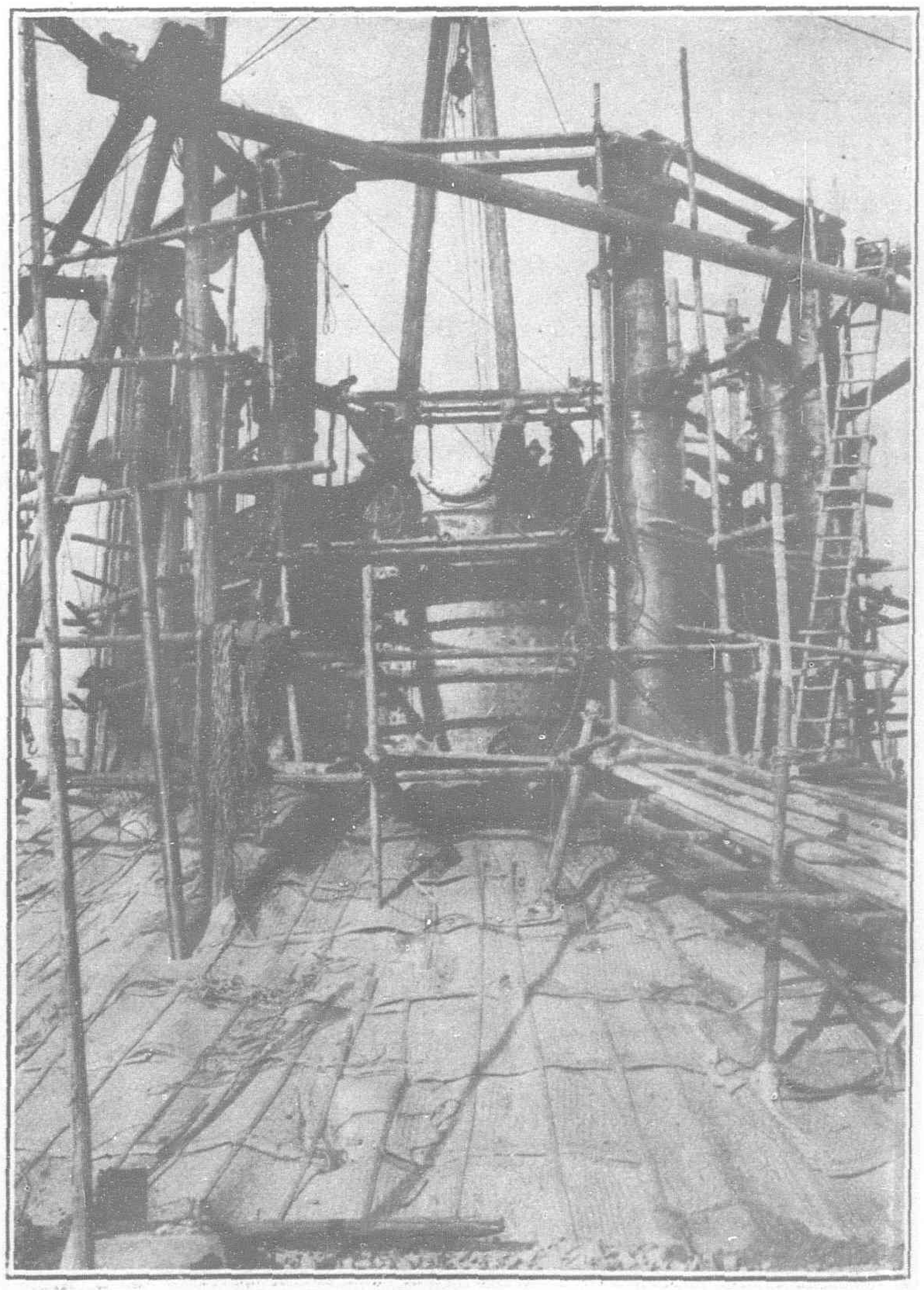
Putting in the Foundations for the New 500-ton Blast Furnace at the Anshan Iron & Steel Works

hoisting machinery and equipment went to the Otis Elevator Company of New York; the coke screening machine to the Robbins Conveyor Company; the furnace bell and hopper and the gas cleaning machinery to the McKee Company and the fire bricks for lining the furnace, to the General Refractory Company of America. The actual erection of the furnace is being carried out by the Anshan engineers. The cost of erecting this furnace is provided for in the ordinary working estimates of the South Manchuria Railway Company.

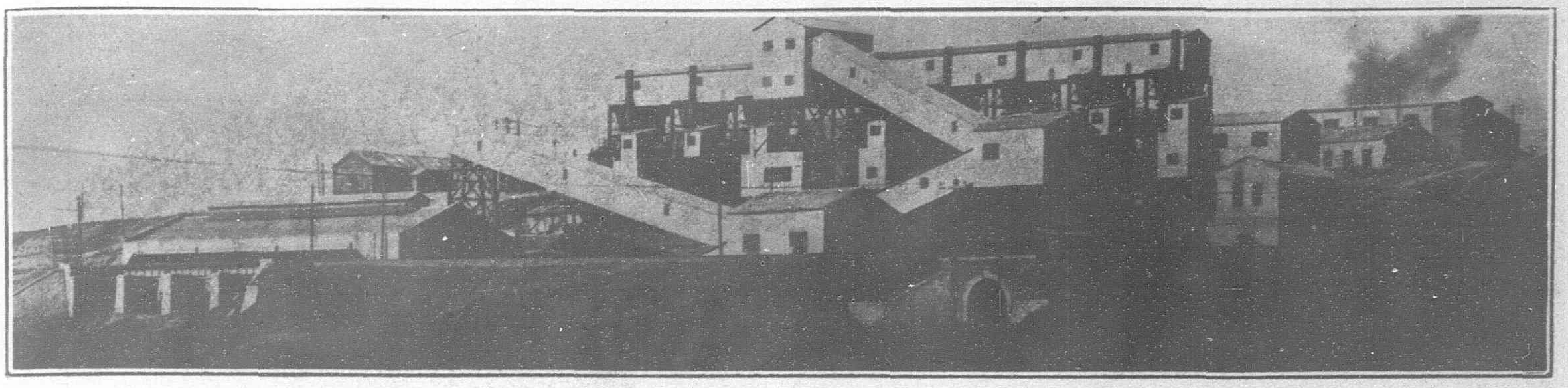
Aside from the low grade of the ores, one of the greatest obstacles to profitable iron making at Anshan has been to find a suitable coking coal at a reasonable price. The Fushan product is not a good coking coal and the Anshan furnaces have been working on coke purchased from the Penshihu Coal & Iron Company. However, as in all other matters, the S.M.R. engineers are determined as far as possible to be self-contained, and in pursuit of this policy have concentrated upon making the best of the Fushun coal for coking purposes. The Anshan furnaces are now being worked with a coke that is a mixture of 80 per cent. Fushun and 20 per cent. Penshihu coal, burnt at their own coke ovens at Anshan. Even this slight dependence upon Penshihu is to be terminated and 100 per cent. Fushun coke is being developed. A shipment of 100 tons of Fushun coal has been set to the United States where it will be experimented upon at Pueblo, Colorado, under the supervision of Perrin, Marshall & Company's coke experts in the endeavor to turn out a suitable coke for metallurgical purposes. These tests

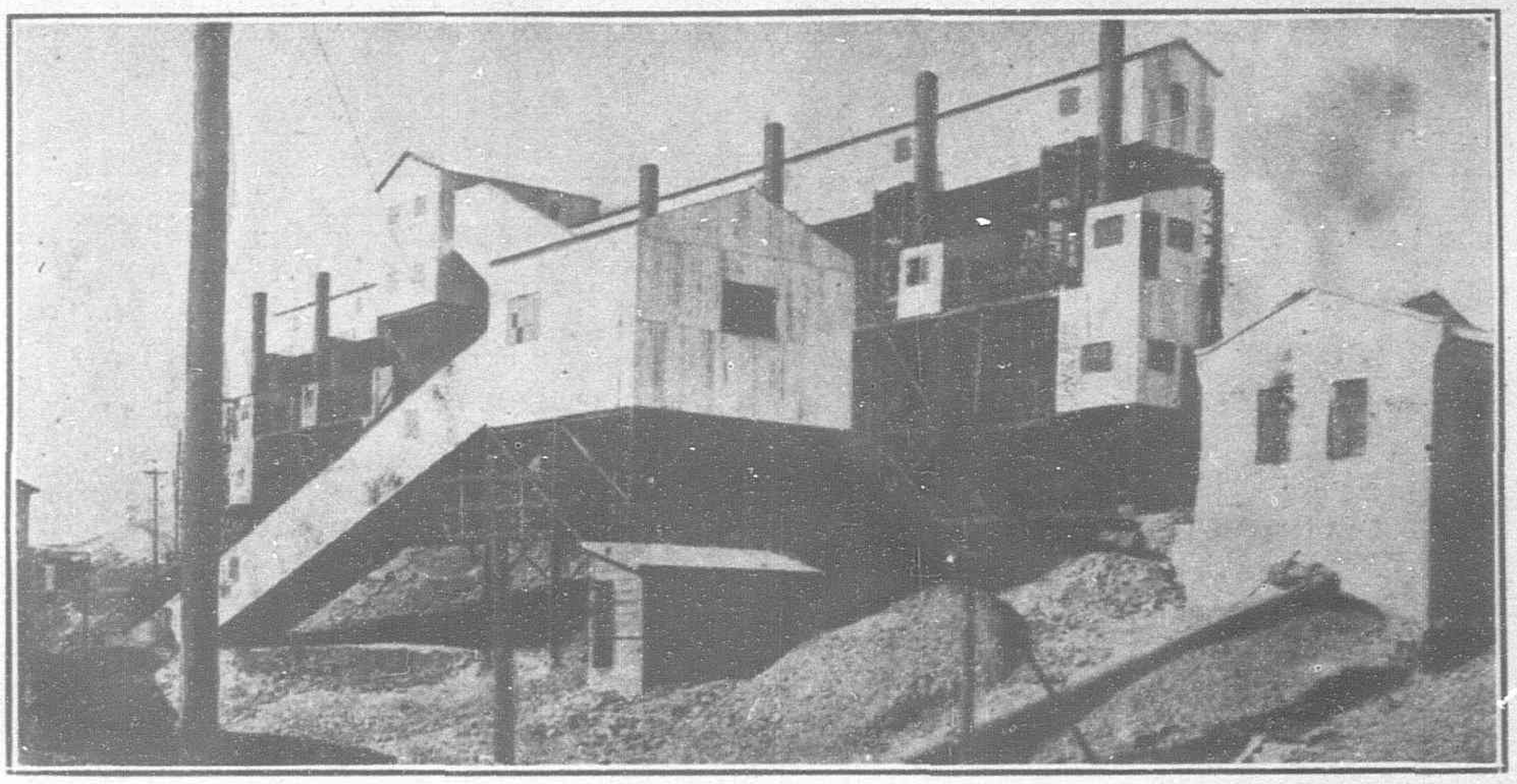


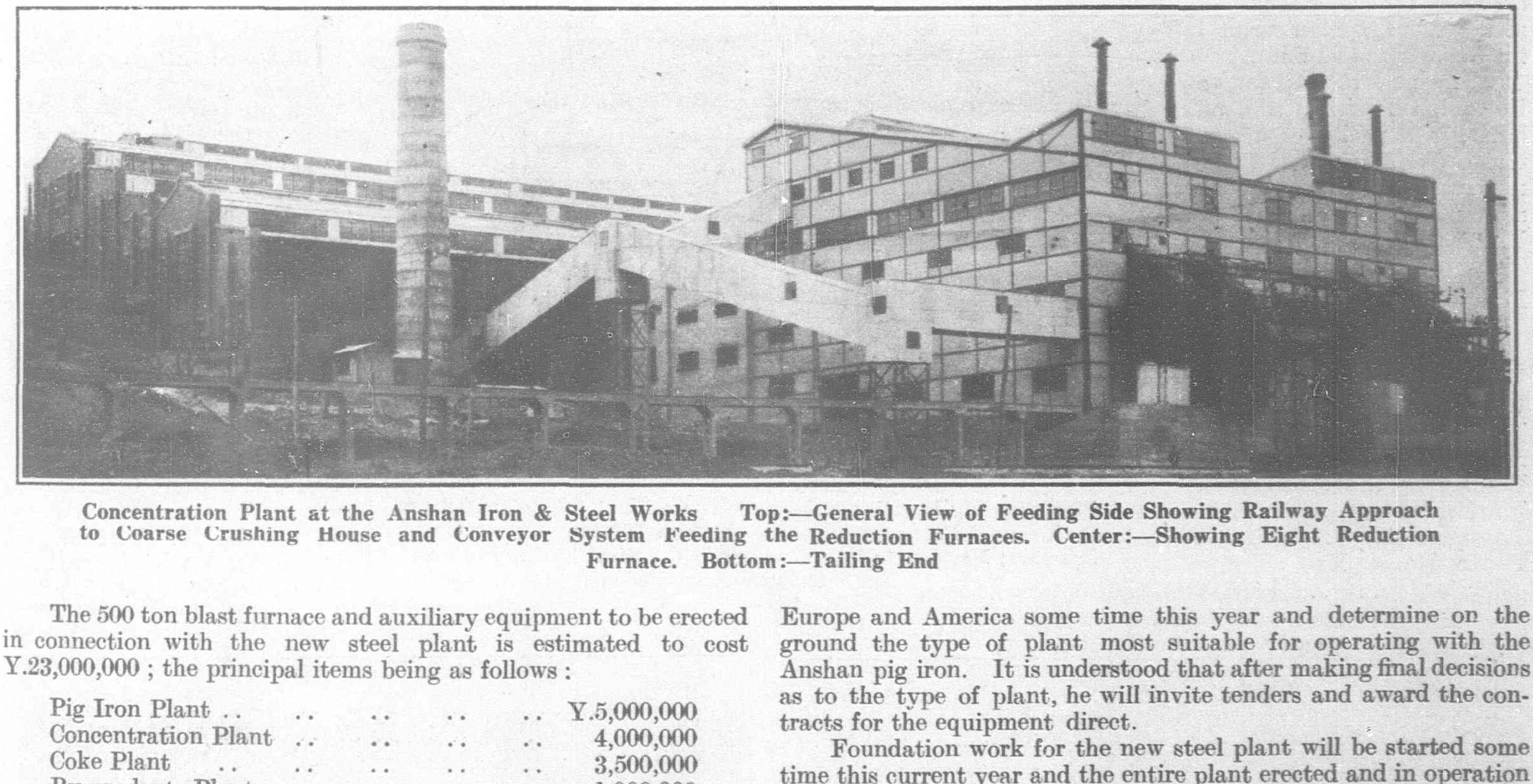
Raymond Concrete File Driver on Foundation for New 500-ton Blast Furnace. Length of Pile, 29 feet; Load, 99,000 Pounds; Settlement 1/13 inch



Erection of 500-ton Blast Furnace, December, 1928







Concentration Plant at the Anshan Iron & Steel Works Top:—General View of Feeding Side Showing Railway Approach to Coarse Crushing House and Conveyor System Feeding the Reduction Furnaces. Center:—Showing Eight Reduction Furnace. Bottom:—Tailing End

are now being carried out. In order to take care of the increased coke supply for the new furnaces, a battery of 50 coke ovens is now under erection. We understand that these new ovens will be of a type that will convert 100 per cent. Fushun coal into a suitable coke. New limestone quarries located near the works are also being developed in order to lower the cost of production.

The 500 ton blast furnace and auxiliary equipment to be erected in connection with the new steel plant is estimated to cost Y.23,000,000 ; the principal items being as follows :

Pig Iron Plant	Y.5,000,000
Concentration Plant	4,000,000
Coke Plant	3,500,000
By-products Plant	1,000,000
Fire Brick Plant	200,000
Waterworks	500,000
Power Plant Extension	2,500,000
Transportation..	800,000
Iron Mining Extensions	3,000,000
Miscellaneous	2,500,000
Total	Y.23,000,000

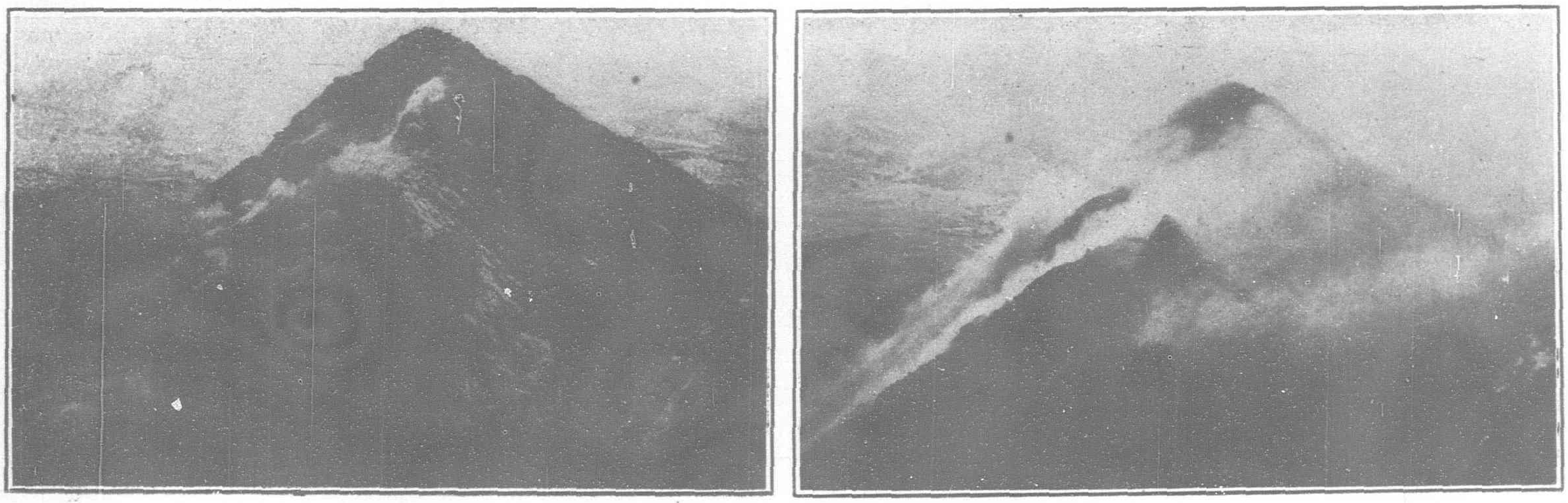
New Steel Mill

These improvements are to be followed almost immediately by the erection of a steel mill having a capacity of 240,000 tons per year. Although the plans for the mill have not been finally decided upon, estimates have been prepared and the whole scheme placed under the immediate direction of Admiral Godo of the Imperial Japanese Navy, who for many years has been in command of the Kure Naval Station, which is equipped with one of the most modern steel mills in Japan. Admiral Godo will visit Europe and America some time this year and determine on the ground the type of plant most suitable for operating with the Anshan pig iron. It is understood that after making final decisions as to the type of plant, he will invite tenders and award the contracts for the equipment direct.

Foundation work for the new steel plant will be started some time this current year and the entire plant erected and in operation by 1932. The pig iron output of Anshan after the additional 500 ton furnace is erected, will be 400,000 tons. Of this, the new steel mill will convert 240,000 tons into steel products as follows :

Small bars under 2-in.	70,000 tons
Black sheets	50,000 „
Tin Plates	10,000 „
Flat slabs and billets	107,000 „
Total	237,000 tons

The bulk of the bars, sheets and plate will find a market in Manchuria and North China. It is expected that the local markets will also absorb 20,000 or more tons of slabs and billets, the balance

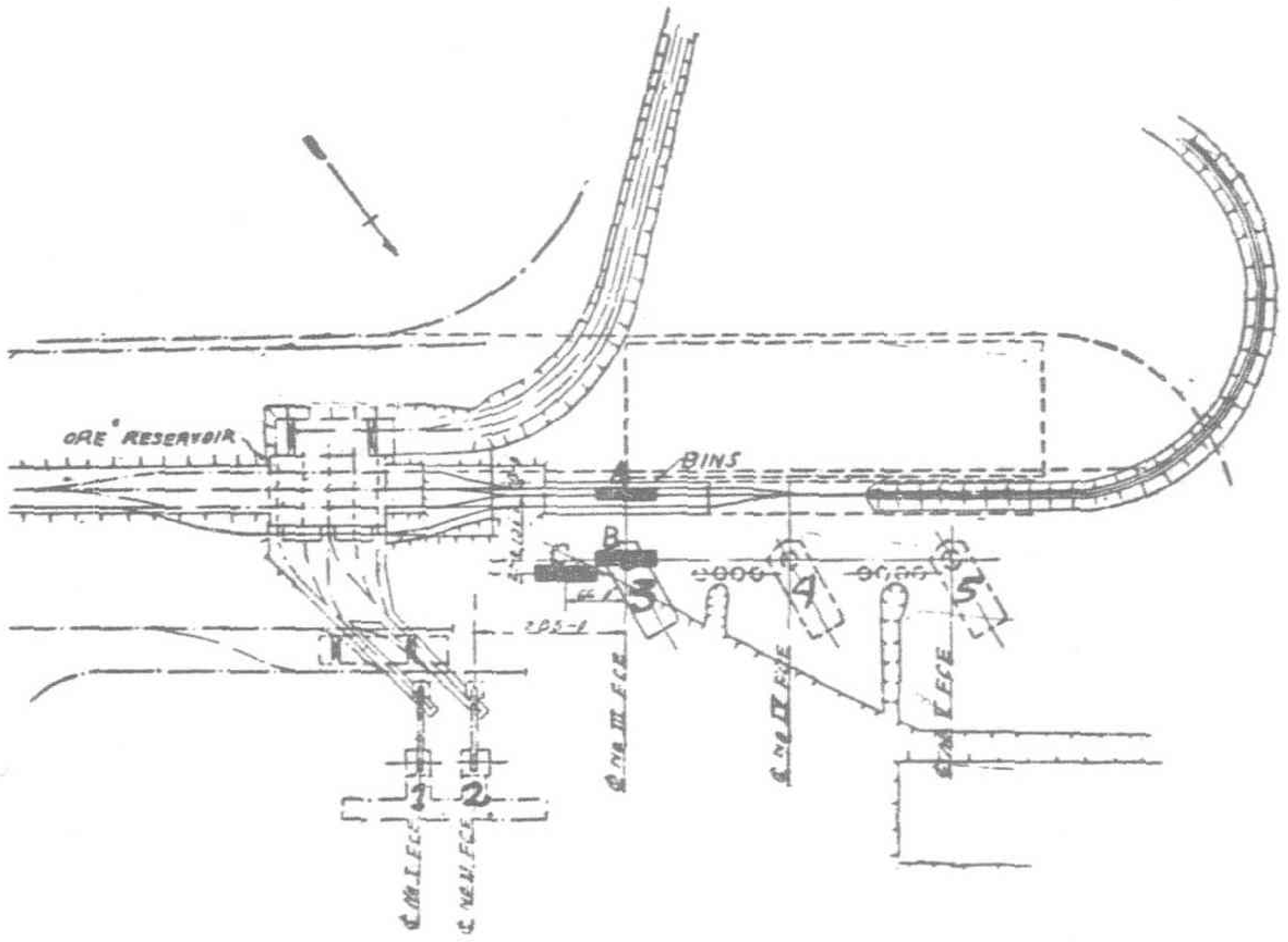


Takushan Iron Mine: Showing Blast of 6-Tons of Explosives Displacing 45,000 Tons of Ore, also General Methods of Mining

(about 80,000 tons) finding an outlet in Japan. The balance of the pig iron (160,000 tons) not used for steel making, is to be exported to Japan. An agreement has been reached between the S.M.R. and the Japanese Government Steel Works at Yawata and with other leading steel makers of Japan, to purchase the entire output of surplus Anshan pig iron. Although the Anshan iron ore is of low grade, its reduction from Hemitite to Magnetite and concentration to a uniform 60 per cent. sintered ore ready for the blast furnace, makes it of special value to the Japanese steel mills.

The new steel plant will be equipped with a slab mill having a capacity of 350,000 tons and a billet mill of 300,000 tons capacity. The cost of the new plant is estimated at Y.21,500,000, the principal items being as follows:—

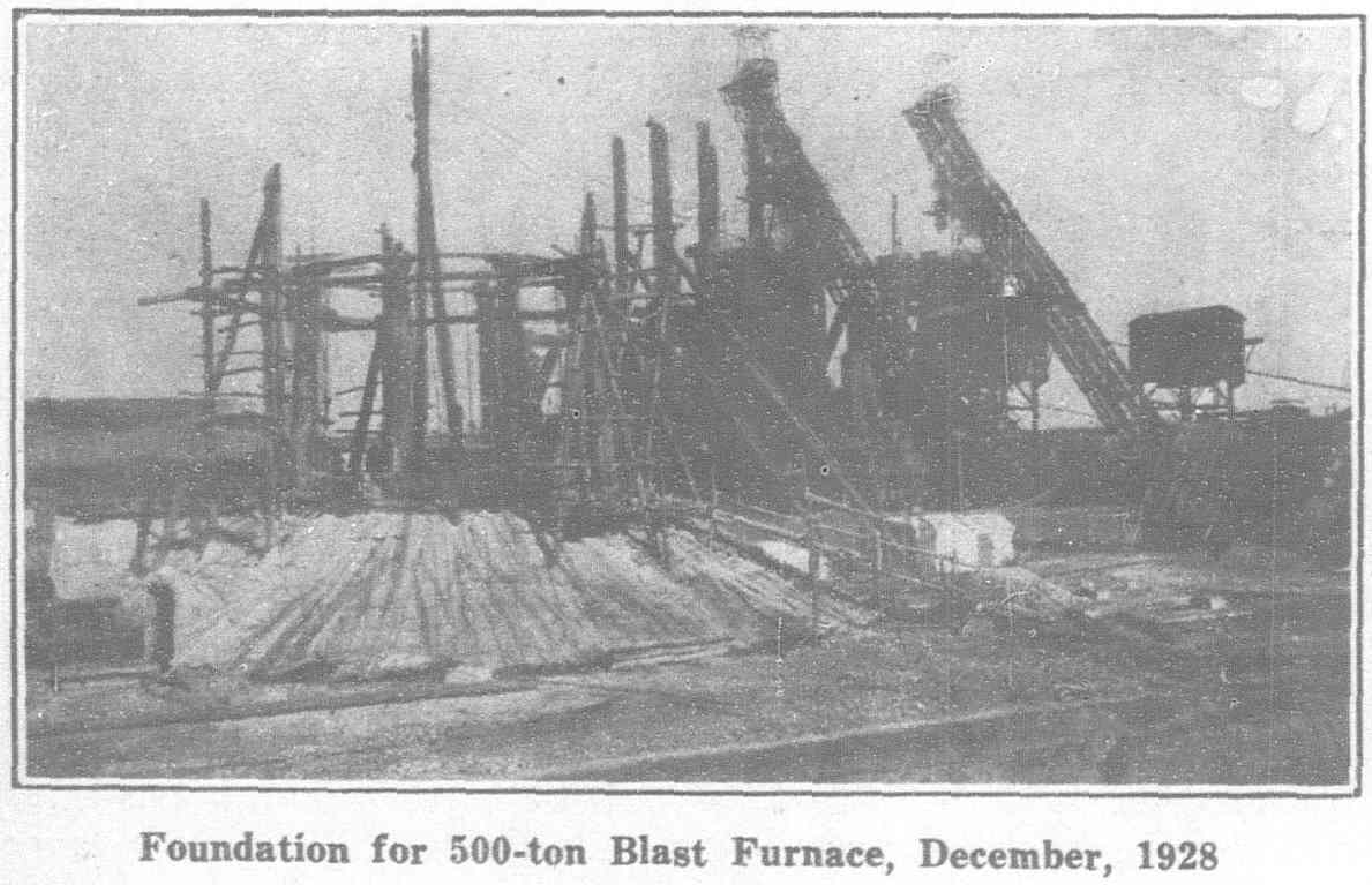
Five Open Hearth Furnaces, 60 ton capacity each ..	Y.6,000,000
Billet and Slab Mills	4,500,000
Rod Mill	900,000
Tin Plate Mill ..	1,200,000
Black Sheet Mill ..	4,000,000
Roll House	200,000
Fire Brick Plant ..	300,000
Transportation ..	500,000
Power House Extension	1,800,000
Water Works	Y.500,000
Miscellaneous	1,600,000
Total	Y.21,500,000



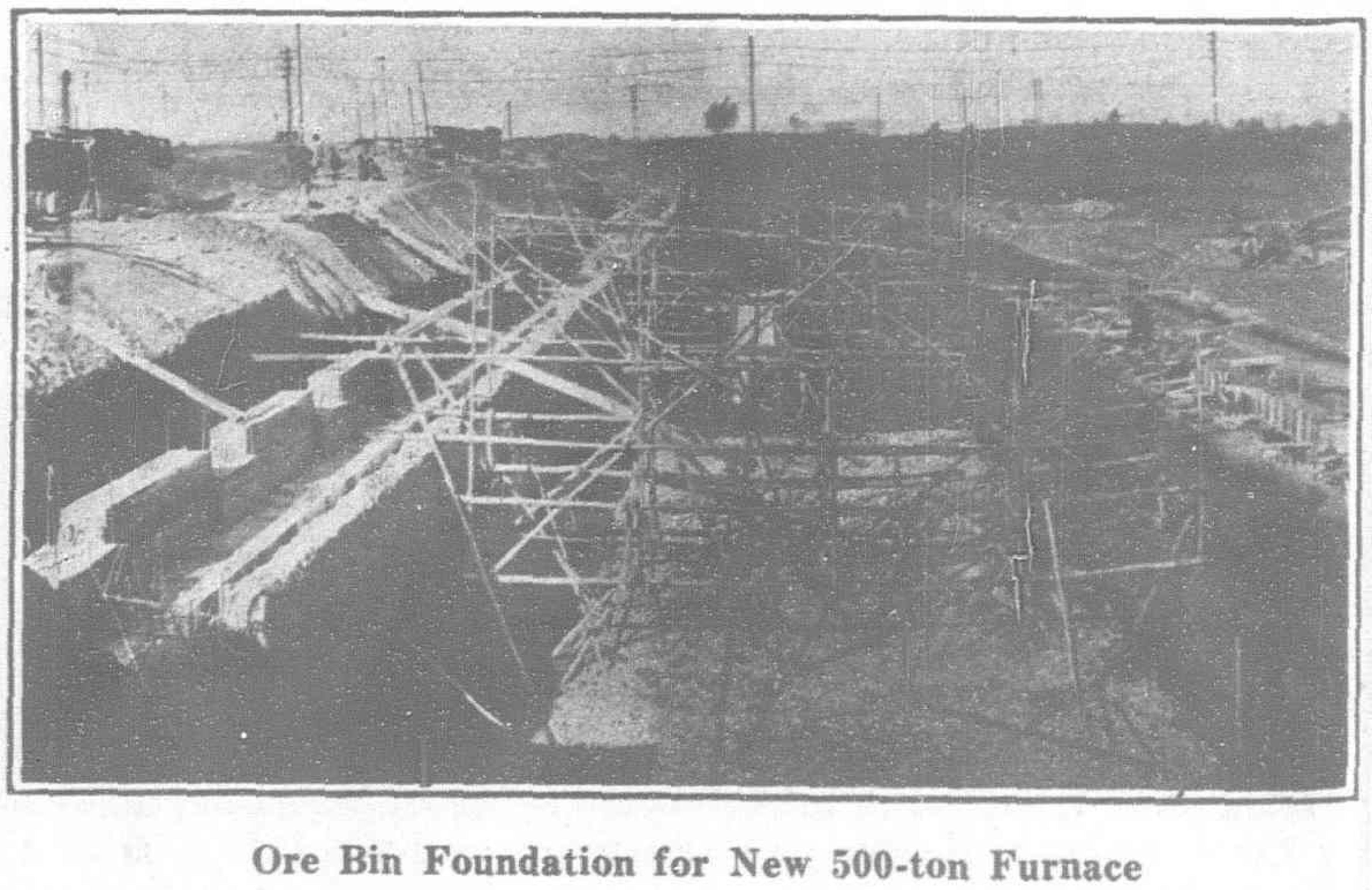
Plan Showing Location of Blast Furnace Plant. No. 1 and 2 are the Original Furnaces. No. 3 is the New 500-ton Furnace Under Erection; No. 4 is to be Added When the Steel Mill is Built and No. 5, is Further Extension

In the above estimates, certain items such as fire brick, power house and waterworks are charged against the blast furnace plant and steel mill proportionately. The present power house capacity is 32,500 k.v.a. as noted elsewhere in this issue under the head of "Japanese Electrical Undertakings in South Manchuria." The total expenditures on power house extensions is therefore Y.4,300,000.

The present investment at Anshan, according to a recent official report of the S.M.R. is Y.45,900,000. The reserve blast furnace being estimated to cost Y.23,000,000 and the new steel plant, Y.21,500,000, increases the total investment of the S.M.R. at Anshan to Y.90,400,000. In addition, a large nitrogen plant capable of producing 70,000 tons of fertilizers is also to be erected at Anshan at a cost of Y.16,000,000, raising the total investment to over Y.100,000,000.



Foundation for 500-ton Blast Furnace, December, 1928



Ore Bin Foundation for New 500-ton Furnace

BEANS

(Continued from page 57).

output will displace bean cake as the standard nitrogenous fertilizer, with a corresponding falling off in the importation of this commodity from Manchuria.

The increased demand in Japan for chemical fertilizers is being met by strong efforts to increase the home production of ammonium sulphate. In 1926, 146,000 tons were produced. Since then, new plants have started operation whose output will raise the total this year to about 250,000 tons. Japan still imports about 247,000 tons of ammonium sulphate annually, and plans are being made to manufacture this at home. The Japan Nitrogen Company, is erecting hydro-electric power stations in Korea of 120,000 kilowatts capacity for a synthetic ammonium plant capable of producing 250,000 tons of sulphate per annum.

The Japanese farmer is becoming to rely more and more upon artificial fertilizer, preference for which is indicated by the fact that despite the natural increase in the consumption of fertilizers the amount of bean cake imported into Japan shows practically no increase in recent years, whereas the imports of ammonium sulphate have steadily increased. In a recent convention held in Tokyo attended by farming specialists from all parts of Japan, it was generally agreed that sulphate of ammonium was superior to bean cake for the soil requirements of the country.

While it may be going too far to state that the importation into Japan of bean cake from Manchuria will be entirely cut off in another few years, the present trend in the artificial fertilizer industry in that country seems to justify that prediction. There is a possibility that a new use can be found for bean cake by its manufacture into "soya-bean flour," a commodity rapidly being perfected and finding a market because of its high protein content. If, however, these new outlets cannot be found, or some other uses discovered for bean cake, the Manchurian farmer must turn to other crops for relief.

What effect this may have on the future of Manchuria can only be conjectured at the present moment. The Chinese are feverishly building new railways in Manchuria in order to compete with the South Manchuria line and divert the traffic of the country to ports under their own control. Granted that the Chinese may ultimately succeed with this program, what will it profit them if the chief market for their most valuable crop is lost? The Japanese will not turn back on the road to achieve economic independence. They have the water power and other resources within their empire to build up a chemical fertilizer industry that will free them from reliance upon outside sources of supply and, although a big dimunition in the Manchurian bean crop would seriously impair the earning powers of the South Manchuria Railway Company, the prosperity of this official enterprise will never be permitted to interfere with the higher interests of the nation. Other sources of wealth will be uncovered in Manchuria that will contribute to the traffic of the S.M.R. but whatever they may be, they can never take the place of beans in the general economy of the territory. In effect, the actual situation discloses that the bean milling industry of Manchuria is paralyzed and nearing its end. Only a few of the most modern mills can be expected to survive. The superior methods of European mills with their large demand for cake as cattle food coupled with the fact that it is more economical to ship beans to Europe and crush them there than it is to ship the oil, operates to the disadvantage of the Manchurian milling industry. It is possible that the steady demand for beans and bean products in Europe will continue to stimulate the export of beans and so equalize the falling off of cake shipments to Japan. It may also be possible to educate the Chinese to eat more beans and bean products and use more bean cake as fertilizer. If so, the economic future of Manchuria is safe, but at the rate the artificial fertilizer industry is growing in Japan, the Chinese will have to get a hustle on, for by the time Japan has freed herself from dependence upon bean cake, her artificial fertilizer industry will be so firmly established that she will be selling more cheaply a better product to the Chinese farmers.

Can the Chinese find a new market for nearly one half of their present bean crop? On their ability to do this depends the future prosperity of Manchuria and the many new railways planned and under construction for opening up territory where agricultural possibilities are limited to bean, kaoliang or wheat.

Book Notes

(Continued from page 63)

In this Russian-French-Belgian effort to destroy China, there were two victims, China and Japan. The effect on the two countries was naturally different: Japan became militaristic and imperialistic, fought for self-preservation, shed blood twice on the plains of Manchuria and emerged one of the Great Powers of the earth; China, during Manchu days, supinely bent before the Russian rod, signed the ignominous Li-Lobanoff Treaty, played the Russian game during the Boxer Rebellion and finally hoped that Great Britain and the United States would save her from Russian tyranny and her own stupidity. The American "Open Door Policy," was Great Britain's contribution to this effort.

Dr. Weigh is the first Chinese to recognize fully the character and political significance of the Li-Lobanoff Treaty. Other Chinese have sought to ignore this key document to the whole history of Manchuria in international relations. He defends his country skilfully when he suggests that China did not adhere to the terms of this defensive and offensive alliance during the Russo-Japanese War. This may be true but how does that affect China's position *vis-a-vis* the sanctity of treaties. However one studies this problem, the Li-Lobanoff Treaty is a nasty business, which, offers full justification for the Anglo-Japanese Alliance and the Japanese development in Manchuria.

For no matter how Chinese may view these problems, the fact remains that in international relations, China cannot isolate herself or enter upon irresponsible alliances without counter-action by other Powers. When China and Russia are in alliance with France and Belgium and when Kaiser Wilhelm is instigating the Czar to become the Admiral of the Pacific, Great Britain and Japan are faced with a struggle for existence which must transcend any sentimental aspects of China's inviolability. Similarly, (and this Dr. Weigh omits) when Dr. Sun Yat-sen or General Chiang Kai-shek or General Feng Yu-hsiang or any other person controlling Chinese territory becomes an adherent to Russian imperialism, the very existence of other countries is threatened and those countries will act. Dr. Weigh's book amply describes Russian imperialism, to which Chinese officials at various periods have offered homage, because it suited some "opportunistic" internal political situation. Other Powers need not consider the motive; the effect is a Sino-Russian alliance which inevitably endangers the peace of the world.

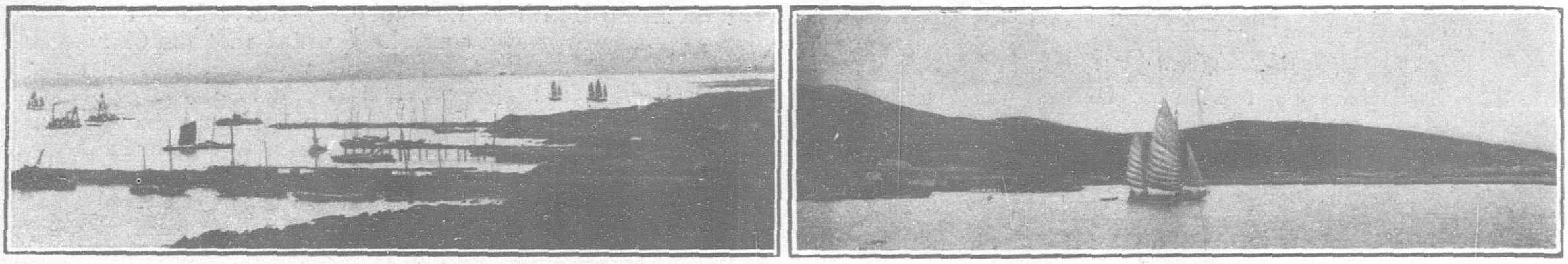
It would be well for Kuomintang leaders, apologists and propagandists, Chinese and foreign, to read Dr. Weigh's book (that is, the first seven chapters), so that they may understand the character and consequences of China's diplomatic history. They may blame Manchu officials for the errors of the past and the Chinese Communists for the errors of the present. The foreigners, however, need not go into all that—they deal with facts, not apologetics.—G.E.S.

THE CHEMISTRY OF WATER AND SEWAGE TREATMENT, is the title of a book just published by Arthur M. Buswell, Chief, Illinois State Water Survey, and Professor of Sanitary Chemistry of the University of Illinois, U.S.A. This book belongs to the family of the American Chemical Society Monograph series, containing 362 pages, 47 tables, and 58 figures and illustrations. To the Chemical Catalog Co. Inc., 419—4th Ave. at 29th St. New York City, U.S.A. belongs the sole right for publication. Price G.$7.00.

Chemical and Sanitary Engineers and all workers in the realm of water and sewage treatment have often longed for a single up-to-date comprehensive treatise on this subject. The progress made in this field has been very rapid, and to keep up with it without any access to good libraries, especially in China, has been most difficult. In Prof. Buswell's book, he has covered all the literature on the subject down to the present time, compiling a bibliography of over four thousand references.

The author confined himself strictly within the scope of his subject leaving out methods of analysis and detailed discussion of the construction and operation of mechanical devices.

The book aside from being ably written, is well put up in the uniform binding of all the American Chemical Society Monographs, and deserves to be on the bookshelves of all those interested in this field.



General View of Kanchingtzu, Showing Shore End of Breakwater and Temporary Construction Wharf, September, 1928

South Manchuria Railway New Coal Port

Mechanical Loading Pier, Equipped to Handle 5,000,000 tons of Coal Annually, Under Construction at Kanchingtzu, Across the Bay from Dairen

ONE of the most interesting engineering developments now under way in Manchuria is the construction by the South Manchuria Railway Company of a new coal storage yard and loading wharf at Kanchingtzu, across the bay from Dairen. This new enterprise is a natural corollary to the steady increase in the output of Fushun coal and the necessity for up-to-date mechanical loading devices to facilitate its export at some central location. The output of Fushun coal for the present fiscal year is estimated to reach 8,100,000 tons. The output in 1927 was 6,715,400 tons. The sales for the same year show a total of 6,836,151 tons, of which, 1,643,373 was sold in Manchuria, 1,117,670 tons were used by the S.M.R., 3,371,982 tons were exported and 703,125 tons delivered to steamship bunkers. Although a small percentage of the exports and bunker coal goes through Antung, Newchwang and Port Arthur, the main volume passes through the port of Dairen. The total volume of coal shipped over the S.M.R. to Dairen for the fiscal year ending March 31, 1928, was 4,194,222 tons, of which 2,900,000 tons were exported. The total volume of import and export cargo passing through the port of Dairen for 1927 was 8,200,000 tons, of which 3,500,000 tons, or 42 per cent. represented coal exports and bunkering supplies.

This large percentage of the total volume of cargo passing through the port has taxed its capacity to the point, where, unless another outlet is found, the coal shipments will press heavily on the limited area and facilities required for storing and handling other cargo. The facilities of the port enable coal to be supplied to steamers either by coolie or mechanical power. Loading by hand can be performed at the rate of 1,200 tons per day, which, for the five coal berthing spaces, gives a total loading capacity of 6,000 tons per day. A special experimental coal wharf was built and placed in operation in June 1926. This is operated on the car-dumper system, the loading being carried out by a belt conveyer and travelling loader, delivering about 4,000 tons of coal per day into the steamers. In addition, the Port of Dairen operates three Mitchner lighters of 500 tons capacity each, having a loading capacity of 100 tons of bunker coal per hour.

In order to concentrate all the coal handling of the port at one point and relieve the strain on the docks and storage space required to take care of the increasing annual volume of beans and other cargo, the S.M.R. purchased a location across the bay from Dairen for the laying out of a new coal storage yard and the construction of a mechanical loading wharf. The first stage of the constuction program is now well under way. The plans provide for a storage yard and loading wharf with a capacity for handling 3,000,000 tons of coal per year, with an extension program that will increase this amount to 5,000,000 tons.

The first stage of the program is to be completed by the end of 1930, at a cost of Y.8,000,000, itemized as follows;

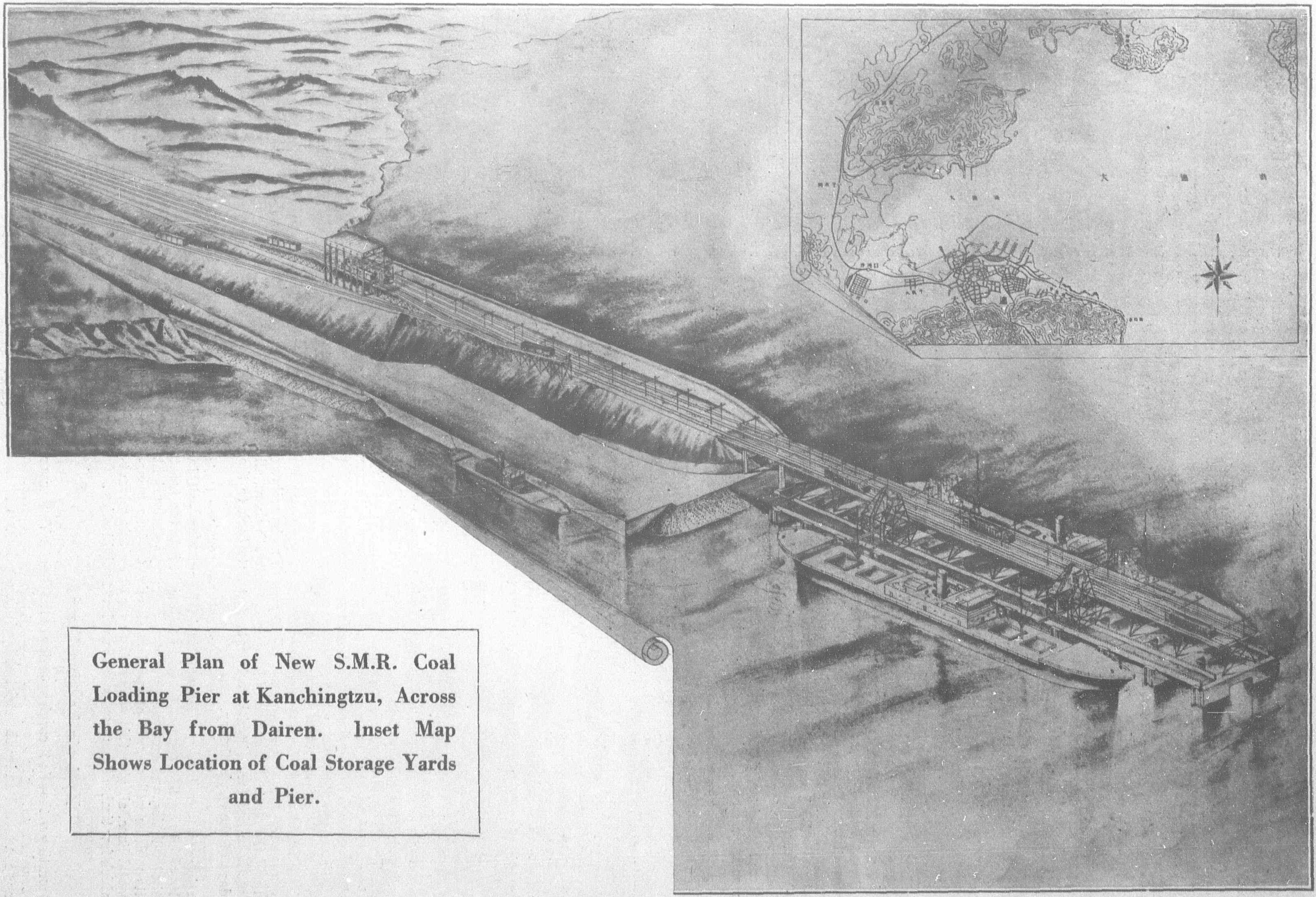
1.	Breakwater parallel to the Main Pier, 700 meters long	Y.1,000,000
2.	Elevated Railway and Wharf	1,600,000
3.	Filling and Reclamation	300,000
4.	Mechanical Equipment; Weigh Bridge, Car Dumper, Bridge Transporters, Pier Cars, etc. ..	2,000,000
5.	Electrical Equipment	300,000
6.	Buildings and Land	100,000
7.	Water Supply Boat	80,000
8.	Railway Tracks	2,200,000
9.	Storage Yard	300,000
10.	Miscellaneous	120,000
	Total	Y.8,000,000

All coal shipments from Fushun will be switched off the main S.M.R. line at Paotzuai, (a little north of Choushuitzu) to a new branch line nine kilometers long, connecting with the coal port at Kanchingtzu. There will be two storage yards laid out near the pier. The main yard will have storage capacity of 350,000 tons, while nearer the pier will be located a smaller yard for storing 100,000 in cars ready for immediate delivery to the pier coal dumper. The main storage yards will be provided with two bridge grab transporters and loaders handling 300 tons per hour each.

The whole system of railway transportation on the nine kilometer branch line, shunting and mechanical handling, will be operated by electricity, the current being supplied by the S.M. Electricity Company's Amanogawa Power Plant at Dairen at a pressure of

Breakwater at Kanchingtzu, November 10, 1928

Caissons for Coal Pier



General Plan of New S.M.R. Coal Loading Pier at Kanchingtzu, Across the Bay from Dairen. Inset Map Shows Location of Coal Storage Yards and Pier.

11,000 volts. A sub-station of 1,500 k.w. capacity will be located near the pier and at least five electric locomotives of the Fushun type will form part of the transportation equipment.

From the storage yards, the coal will be transported by electric power to a 100 ton weigh-bridge which automatically weighs and records the weight of the cars while in motion. The S.M.R. has now in operation over 200 steel coal cars of 60 tons capacity made at their Shakako Shops and by the Dairen Engineering Works. The Railway Company intends to replace all of their old 30 and 50 ton cars with the 60 ton type in order to run longer and heavier trains. From the weigh-bridge, the individual coal cars will be pushed up the incline to the car dumper by an electric mule operated on an endless wire rope arrangement. The coal dumper is designed to handle any size car at a rate of thirty 300 ton cars per hour, or 900 tons. The coal is then dumped into electrically operated pier cars, of which there are five of 65 tons capacity each, which carry the coal out to pier itself, discharging into the hoppers of the pier transporters and loaders and returning to the car dumper for another load.

The pier has a total length of 425 meters, but the actual coal loading end is only 175 meters long with a depth of water alongside of 10 meters. The pier floor is 19 meters above the low water level. The lower pier, 34 meters wide consists of the concrete footings and foundation supporting the upper steel or working pier (17.6 meters wide,) carrying the railway tracks for the pier cars.

The loading machines, as shown in the illustration and plans are equipped with hoppers, bucket conveyors, telescope chute, mechanical trimmer and anti-breaker. The entire mechanical equipment consisting of the special bridge work, car dumper, pier transporters and loader, pier cars etc. were designed and upplies by the Wellman, Seaver, Morgan Company of America.

The above plant and equipment, designed to handle 3,000,000 tons of coal per year, constitues the first stage of the program. On its completion, extensions will be made that will raise the capacity of the pier to 4,800,000 tons per year at an extra cost of Y.2,700,000. When fully completed in 1933, the initial breakwater, 700 meters long will be extended 150 meters and the pier itself lengthened from 175 to 300 meters, providing berthing for four steamships. Another weigh bridge, car dumper, an extra pier car and two more transporter loaders will be added to increase the daily handling capacity to 16,200 tons or 4,860,000 tons per year. An extra grab transporter at the storage yard will also be added. The entire plant when completed will cost Y.11,000,000.

The lack of water at the pier compels the use of water boats to supply the steamers until such time as mains can be laid to connect with the Dairen water supply system, a distance of 18 kilometers. When these mains are laid and a proper water supply assured, it is the intention of the S.M.R. Company to lay out a small town near the coal wharf for the convenience of the workers and the ships which utilize its facilities.

In addition to the Kanchingtzu Coal Pier described above, the S.M.R. is constructing a coal pier at Newchwang that will be ready by July of this year. This pier will be capable of handling 600,000 tons a year. The Port Arthur jetties are having two new berths added for coaling purposes raising the capacity of that port to about 800,000 tons annually. When all these works are completed, the S.M.R. will have loading facilities at its three deep-water terminals, enabling it to export 6,400,000 tons of coal per year. Contrary to the prevailing opinion in China, that Japan is relying upon Fushun Coal for its own industrial needs it is interesting to note that out of a total output of 8,700,000 tons estimated for the current year, only 1,950,000 tons are destined for Japan, or, about half the total exports and bunkers. The import of coal into Japan is regulated by the Coal Dealer's Federation who prevailed upon the S.M.R. to reduce its exports to the home country so as not to create a surplus in the market that would lower prices. Consequently, the S.M.R. is expanding its export markets for Fushun Coal in other Far Eastern countries.

British Columbia Red Cedar for Japan

MAKING the name and fame of British Columbia red cedar famous in Japan in particular, and the Orient in general, has been the task of the Capilano Timber Co., Ltd., for nearly a decade past, and in that time the firm has been rewarded by a gratifying increase in its business, especially in Japan. In fact, the firm's timber export business to that country in which it was the pioneer, has grown to such proportions that five different Vancouver lumber firms are now engaged in the task of supplying the Japanese market.

Through it all, the Capilano Timber Co. has more than held its own by adherence to its policy of shipping nothing but the highest quality of British Columbia red cedar to the Japanese market. As a result this sterling wood is very popular in Japan, which takes large quantities of it—both in logs as well as the familiar "Japan squares," which the mills in the Orient cut up to suit their local market. The Japanese buyer is very particular about the quality of the logs which he buys for consumption in Japan, and with one of the finest stands of red cedar on the Continent to draw from, the company is able to meet the most exacting specifications as to size and quality in its shipments to the Japanese market.

The splendid stand of red cedar, which this company possesses on the upper reaches of the Capilano valley, as well as its railway system and the strategic location of its mill on the north shore, all represent keen and far-sighted investments that date back to the early days of the city's history.

In some respects the location of the Capilano Timber Co.'s mill, facing as it does Vancouver, Canada's third largest city—within 35 miles of logging line running from the mill right into the heart of its timber limits, and excellent tidewater shipping facilities right from its mill, as well as rail connection shortly to four trans-continental lines, all give this progressive concern certain advantages which few timber firms now possess so close to civilization.

Hygienic Logging Camps

Operating as they do through a portion of the Greater Vancouver water board's territory in the Capilano valley, all logging operations there are conducted under the strictest hygienic regulations of the provincial health department in order to avoid any possible contamination of the water supply. In the carrying out of these regulations, the company and its staff are co-operating whole-heartedly with the provincial health department.

The mill has a daily output of approximately 150,000 ft. per day, while the modernly equipped shingle mill adjoining can also produce up to 600,000, or approximately three carloads, of the finest red cedar shingles daily. These latter are marketed under the trade outname of "Edgwood" as part of the product of the Consolidated Shingle Mills of British Columbia Ltd. Handling such large quantities of red cedar, the company is able, by operating its own saw and shingle mills in close proximity, to get the utmost possible out of the log, reduce economic waste to the minimum and at the same time keep their product in both lines of the very highest quality, which the export trade demands.

For certain uses, which are being found more extensive every year, the red cedar grown in British Columbia is conceded to be in a class by itself. Its straight grain, easy working qualities, its value for lining clothes closets and protecting the contents from moths, as well as its beautiful finish when used in the natural state, all combine to make this wood in great demand by leading wood-using industries all over Canada and the United States.

Selecting the Right Logs

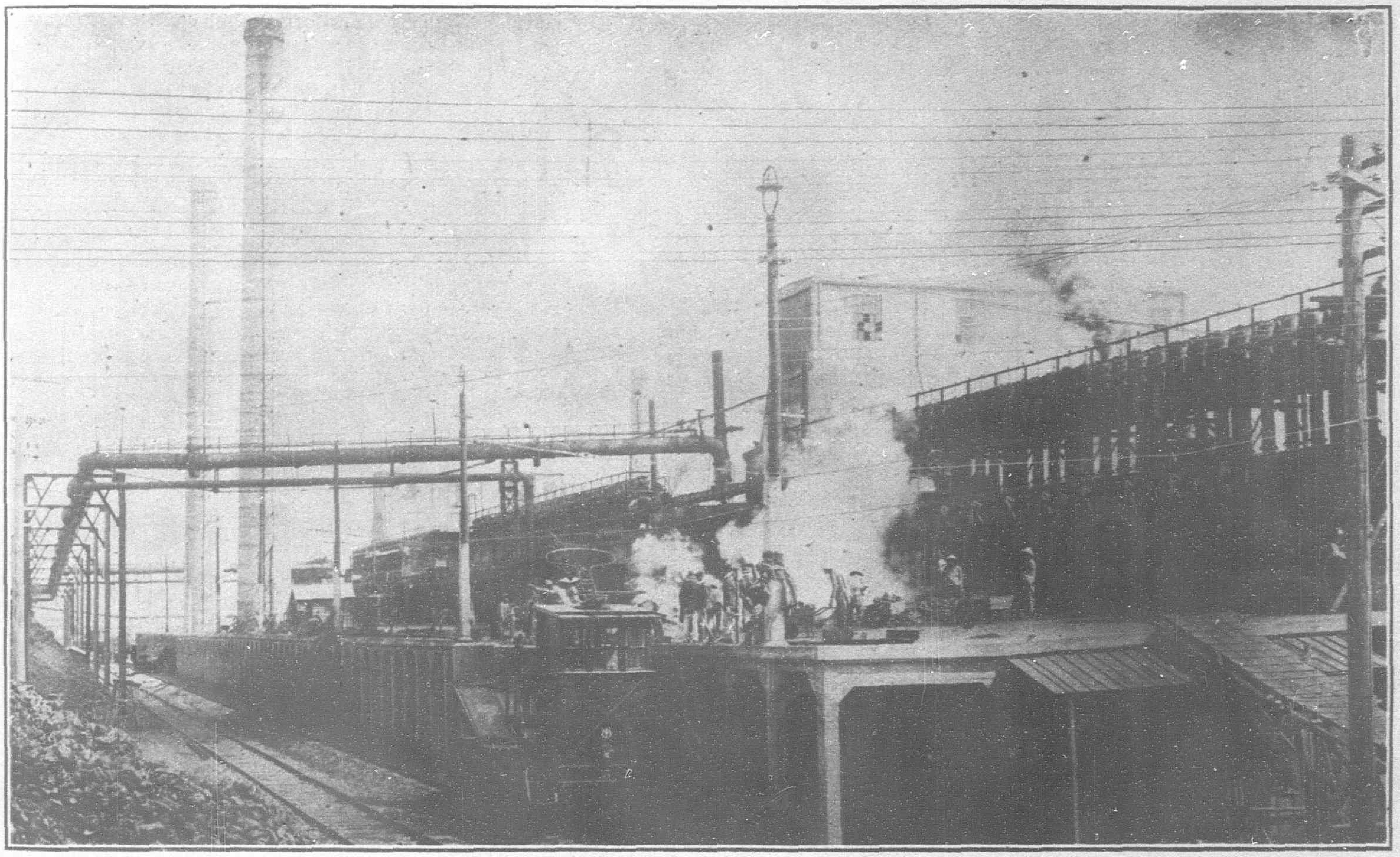
In order to improve its export facilities and allow cut logs to be loaded direct on steamers for the Japanese and other export markets, the Capilano Timber Co. recently drove dolphins and mooring piles in deep water just outside its mill and booming ground. This has proved a great facility to the export trade, and half-a-dozen large steamers have loaded in this way of late. The logs are picked up right out of the water by the vessel's winches and stowed to the best advantage, it being possible to select from the large number of logs right at hand in the booming ground just the particular sizes needed to stow to with all possible saving of space. With these improved facilities, the company is looking forward to a still greater expansion shortly in its export business, not only to Japan, but to other parts of the globe.

Japan's Iron and Steel Industry, 2

Coal and Coke

By J. H. Ehlers, Assistant Commercial Attaché, Tokyo

PERHAPS the most important factor in the Japanese iron industry is that of obtaining adequate supplies of satisfactory coke at reasonable prices. Japan has an abundance of coal for the maintenance of its present industrial state in general, including supplies of coking coal sufficient for the present iron industry. With respect to providing a satisfactory quality of coke for iron smelting, however, Japan's coals possess many defects. The total coal reserves of Japan are estimated at somewhat over 9,000,000,000 tons.



Coke Ovens, Aushan Iron and Steel Works, Manchuria

The following table shows these reserves as actually determined and as estimated:

COAL RESERVES OF JAPAN, CHOSEN, AND MANCHURIA

[In millions of metric tons]

	Actually determined			Probable			
Districts	Anthracite	Bituminous	Lignite	Anthracite	Bituminous	Lignite	Total
Karafuto	—	17	—	—	1,345	—	1,362
Hokkaido	—	336	—	—	2,106	233	2,675
Kyushu	—	542	—	—	2,374	—	2,916
Other	5	1	67	57	409	478	1,017
Japan total ..	5	896	67	57	6,234	711	7,970
Chosen	7	1	5	33	13	22	81
Manchuria ..	—	409	—	68	731	—	1,208
Grand total ..	12	1,306	72	158	6,978	733	9,259

The foregoing table was compiled by K. Inoue, of the Imperial Geological Survey and was taken from an article on the iron and steel industry of Japan by Dr. Ing. E. Kothny. The northerly island of Karafuto (also known as Sakhalin) is considered rich in coal deposits, although it has not been fully prospected. The northern, or Russian half of this island contains large quantities of coal, and many of the mines there are being worked by Japanese interests under concessions.

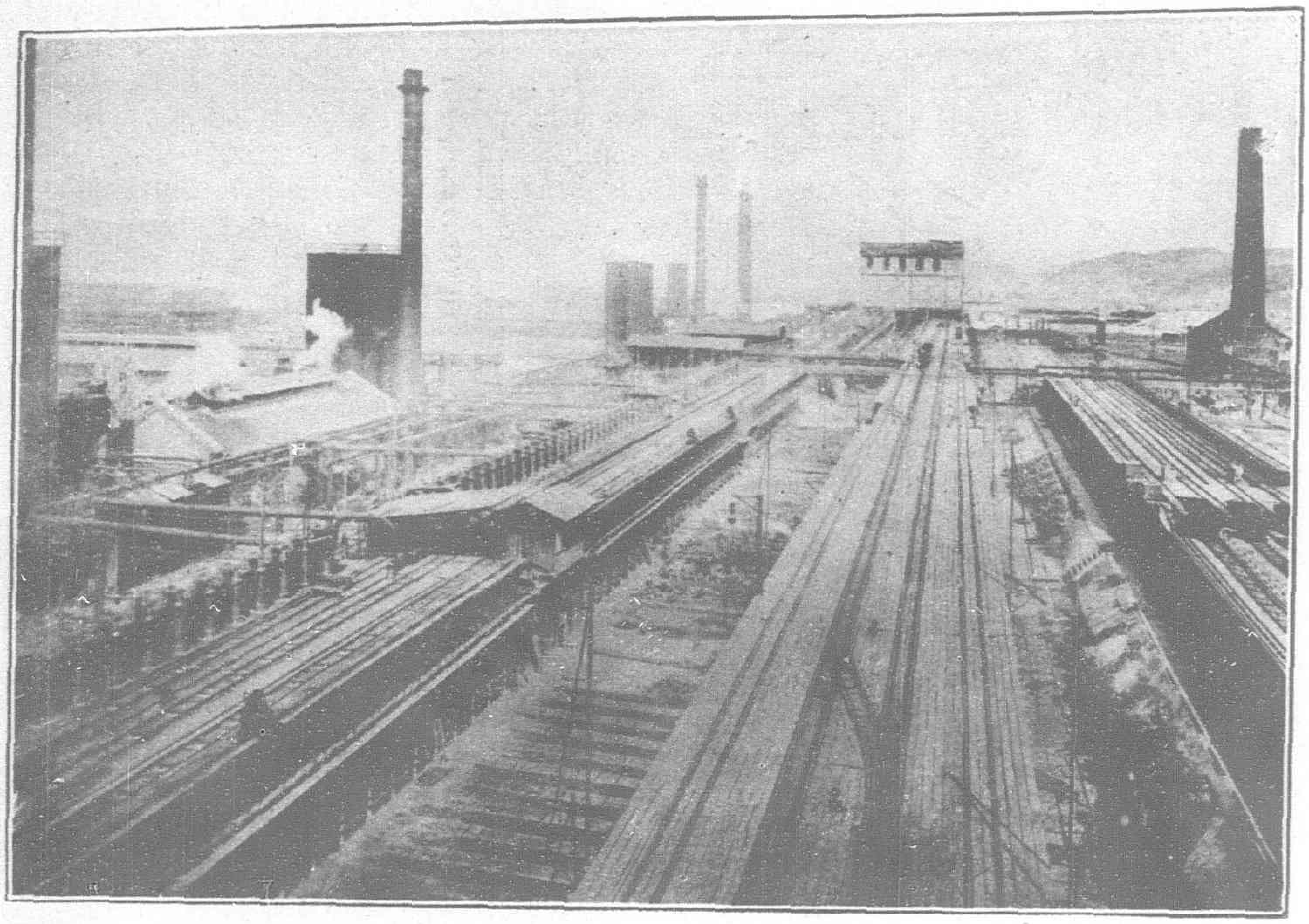
The total production of coal in Japan is now in excess of 30,000,000 tons annually, with exports and imports each in the neighborhood of 2,000,000 tons. Prior to 1922 the exports exceeded 2,000,000 tons, while the imports were about 750,000 tons. Since 1921, however, the exports have declined somewhat, while imports have greatly increased.

The production, exports, and imports of coal are shown as follows:

JAPANESE COAL PRODUCTION AND TRADE

[In thousands of metric tons]

Year	Production	Exports	Imports
1917	27,287	2,791	707
1918	29,124	2,180	762
1919	32,713	2,001	700
1920	30,828	2,130	797
1921	27,676	2,388	777
1922	29,481	1,691	1,169
1923	30,941	1,574	1,686
1924	32,213	1,711	1,980
1925	31,450	2,700	1,741
1926	31,485	2,590	2,013
1927	33,400	2,173	2,661



Coal Washing Plant and Coke Ovens at the Yawata Steel Works

The following table reviews the output of the chief coal fields of Japan proper :

Output of the Chief Coal Fields of Japan Proper
(In thousands of metric tons

Coal field and operator	1926
Miike (Kyushu), Mitsui Mining Co.	2,109
Yubari (Hokkaido), Hokkaido Coal Co.	1,153
Bibai (Hokkaido), Mitsubishi Mining Co.	823
Mitsui-Tagawa (Kyushu), Mitsui Mining Co.	1,019
Onoura (Kyushu), Kaijima Mining Co.	1,360
Futase (Kyushu), Department of Agriculture and Forestry	949
Iriyama (Iwaki), Iriyama Coal Mining Co.	413
Hokoku (Kyushu) Meiji Mining Co.	530
Matsushima (Nagasaki), Matshushima Mining Co.	443
Nakatsuru (Fukuoka), Taisho Mining Co.	490
Uchigo (Iwaki), Iwaki Coal Mining Co.	864
Namazuta (Kyushu), Mitsuibishi Mining Co.	606
Shinnyu (Kyushu), Mitsuibishi Mining Co.	575
Tadakuma (Kyushu), K. Sumitomo	425
Mitsui-Yamano (Kyushu), Mitsui Mining Co.	597
Kishima (Kyushu), Takatori & Co.	219
Shin-yubari (Hokkaido), Hokkaido Coal Co.	557
Sorachi (Hokkaido)	404
Sunakawa (Hokkaido)	516
Takashima (Kyushu)	340

According to the latest statistics, there are 272 coal-mining companies in Japan, with a total capitalization of Y.660,000,000 of which Y.429,000,000 is paid up.

The coal produced in Japan is, in general, lacking in coking qualities. The coal from the following mines is, however, considered satisfactory for coking purposes : Futase, Shikano, Takashima (340,000 tons in 1926), Matsushima, Namazuta, Sakito (501,000 tons in 1926), and Tadakuma Sakano (310,000 tons in 1926). The Yubari, Shin-Yubari, Kamoi, and Mojiri mines, in the Hokkaido, also produce satisfactory coking coal.

The Miike colliery is one of the largest in Japan and produces coal suitable for general use as well as for coking. The sulphur content is high, however, being about 3.6 per cent.

The Yawata Steel Works owns the Futase mine in Kyushu, which produces nearly 1,000,000 tons per year of coal of satisfactory coking properties. The Yawata Works supplies one-half of its coking coal requirements from this mine.

The coal from the Hokkaido mines cokes easily, but the coke is brittle. The Yubari mine is the principal producer of this area and produces over 1,000,000 tons per year of good coking coal of low sulphur content (0.44 per cent).

The ironworks in Kyushu are supplied with coal from Kyushu, using also, however, some coal imported from China. The blast furnaces in the Hokkaido, northern Japan, and Tokyo districts use Hokkaido coal for coking.

There are supplies of coal in Manchuria sufficient to justify any iron industry that the ores of the district make possible. The Penhsihu colliery produces good coking coal, and the gigantic Fushun colliery of the South Manchuria Railway produces good coal from which coke can be made when mixed with Penhsihu and other coals. The Fushun collieries have large open-cut works with a coal seam of an average thickness of 130 feet. This coal, while utilizable for coking purposes when freshly mined (when mixed with other coals as mentioned above), is said to lose its coking qualities rapidly after shipment and hence it is difficult to use in blast furnaces far from its source. The Manchurian cokes are high in ash and moisture content.

Briefly, it may be said that the coals in Japan are not particularly satisfactory for coking and that the poor quality and high price of coke is one of the chief obstacles to the economical production of pig iron in Japan. Experiments are being conducted in getting coke from coals not now considered coking coals, by mixing with other coals, by mechanical packing, and by other means.

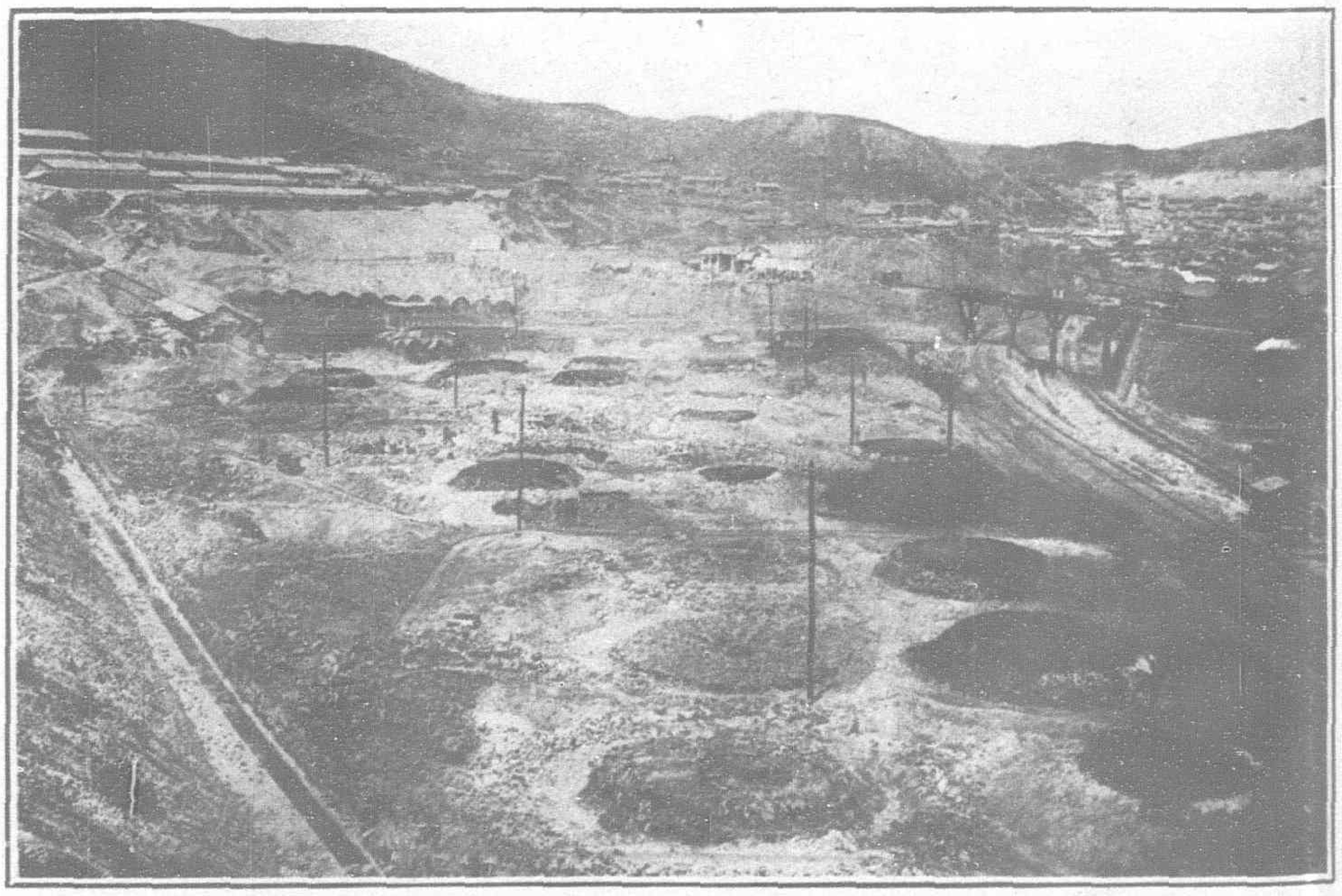
The consumption of coal to produce coke for use in steel making, classified by sources, was as follows for the year 1925 : Kyushu coal, 958,000 tons ; Hokkaido coal, 247,000 ; China coal, 320,000 ; Karafuto coal, 10,000 ; Manchurian coal, 321,000 ; a total of 1,856,000 tons.

The amounts of coal used for foundry work were as follows : Kyushu coal, 281,000 tons ; Hokkaido coal, 86,000 ; China coal, 74,000 ; Karafuto coal, 8,000 ; Indo-China coal, 23,000 ; Chosen coal, 4,000 ; a total of 475,000 tons.

Of the Kyushu coals, the following amounts were furnished from the various mines : Futase, 781,000 tons ; Matsuura district, 87,000 tons ; Shikamachi, 56,000 tons ; Takashima, 20,000 tons ; others, 14,000 tons.

The Chinese coals were classified as follows : Kaiping, 200,000 tons ; Penhsihu, 41,000 tons ; Shisan, 30,000 tons ; Hakusan, 27,000 tons ; Fushun, 22,000 tons.

The Manchurian coals (Japanese-controlled mines) were classed as follows : Fushun, 139,000 tons ; Honkieko, 172,000 tons.



Native Coke Burning at the Penchihu Coal and Iron Mines, Manchuria

The Hokkaido coals were classified as follows: Yubari, 108,000 tons; Sorachi, 99,000 tons; Sunakawa, 39,000 tons.

The number of coke ovens in operation in 1925, classified by oven types, were as follows: Kuroda system, 307; Koppers system, 160; Miike system, 60; Walputte system, 234; Okamoto system, 24; Coppee system, 52; Beehive system, 163. In addition to these, there were 80 by-product coke ovens and 106 beehive ovens in Manchuria.

Of the coal used for coke for steel manufacture, 876,000 tons were lump coal and 50,000 tons dust coal. Of the coke used for foundry work, 294,000 tons came from lump coal and 22,000 tons from dust coal.

In 1925, 1,381,000 tons of coal were used for coke, from which 1,037,000 tons of coke were produced for the iron and steel industry. The great majority of the ovens were by-product ovens. The following amounts of by-products were produced: Tar, 73,500 tons; sulphate of ammonia, 16,100 tons; naphtha, 700 tons; creosote, 12,500 tons; pitch, 34,900 tons; benzol, 7,200 tons.

The high cost of coal which presents such an obstacle to the iron and steel industry, is due to a variety of causes. The mines in Japan proper are in general of thin seams and faulted structure and are troubled with seepage and gas. The production of coal per miner annually is lower than in other great coal-producing countries, although, of course, the amount of machinery used is much less than in western countries. The production per miner before the war was 124 tons annually. In 1921 this declined to 106 tons but has since risen to about 130 tons per man.

In Kyushu, lump coal is quoted at Y.12.50 per ton for No. 1 and Y.10.50 for dust. Kaiping dust coal from China sells in the Tokyo district for over Y.20 per ton. In general, the Tokyo price of Kyushu coal is now Y.3 per ton higher than the price in Kyushu and Y.1.50 to 2 higher than the price in the Osaka district. Coke in the Kyushu district costs about Y.15 per ton, being one and a half times the price of coal. The Yawata Steel Works produces its own coal at about Y.9 to 10 per ton. In the Tokyo district, Hokkaido coal is used for coke making, the price being from Y.9 to 12 per ton, coke at present costing about Y.16 per ton, this coke having 20 per cent. ash and being none too satisfactory for use in a blast furnace.

As indicative of the price of coal, it is noted that the Ministry of Railways has just decided to purchase 900,000 tons of coal for the coming year at an average price of Y.11.64 per ton.

Coke is imported in small quantities, largely from China. Such coke is principally for foundry use. During recent years some has been imported even from England and Germany, while the imports from China have rapidly declined. In 1916, 2,500 tons were imported, while in 1917 imports rose to 51,000 tons and to a maximum of 77,000 tons in 1918. This declined to 19,000 tons in 1924 and then fell off abruptly to 7,000 tons in 1925, 6,000 tons in 1926, and slightly over 4,000 tons in 1927. The average value in 1918 was Y.40 per ton, declining to Y.30 per ton in 1924, and to Y.27 per ton in 1927.

It is obvious from the foregoing figures that the iron-producing industry in Japan is at a great disadvantage in comparison with that of the United States and other great iron-producing countries which have an abundant supply of low-priced coking coal,

Consumption of Raw Materials

The consumption of raw materials at various stages of the manufacturing processes of the Japanese iron and steel industry is shown in the following table. This information was furnished by the Japanese Mining Bureau and is based on reports submitted by the various iron and steel companies. The decline in the use of charcoal for iron making is clearly indicated, as well as the decline in the use of iron sands for iron production. (The figures in this table are not entirely consistent and disagree with other figures the writer has used. The table as a whole, however, contains the best available information on materials actually used.)

Where to get scrap iron is one of the problems facing the Japanese iron and steel industry, the local supply being inadequate for steel-making requirements. It should be noted, however, that the principal steel works is located at tidewater, convenient for receiving supplies obtained from other parts of the Orient as well as from other points having direct steamship communication.

Economic Factors

It is apparent from the foregoing tables of reserves and production that Japan's own ore supplies are inadequate for its present industry. The alternative is to obtain supplies from other countries which have ores in excess of their own requirements.

For the past few years the average cost of all imported ores, as computed from import returns, has averaged Y.8.50 to 9 per metric ton. The average iron content of these ores is probably well over 55 per cent, say, about 57 per cent. They are easily smelted and yield good pig iron for basic open-hearth practice, to which the Japanese steel-producing facilities are limited.

One blast furnace in the Hokkaido obtains Chinese ores of about 57 per cent. iron content at Y.9 per metric ton. The average cost of ores of nearly 60 per cent. iron content has been about Y.10 per ton. Malayan ores of over 60 per cent. iron content are delivered at about Y.11 per ton. Ores from Chosen of 50 per cent. iron content are available at approximately Y.7 per ton.

It is thus obvious that Japan is receiving supplies of suitable ores at prices which compare favorably with those obtaining at Pittsburgh and other profitable blast furnace areas of the United States.

The ore supply has been a great problem, but it has not been a major obstacle in the development of the industry up to its present state, and of the various factors it is the one which has been brought most nearly to a satisfactory solution. The task now is to obtain additional regular supplies to justify the expansion of the local industry.

The iron-ore reserves of the Far East are, in general, too scattered to warrant many separate industries. The considerable supplies of the Malay Peninsula do not justify the establishment of an iron-making industry there, partly because the local market for the products of such an industry is very small and partly for want of suitable supplies of fuel. Fortunately, however, the cost of extracting this ore is such that it can also bear transportation charges to those Japanese furnaces located at tidewater.

The Chinese situation is somewhat different, although production has, at this time, practically disappeared, owing to a variety of causes of which the more outstanding are the excessive cost of coke, a general lack of organization and efficiency in operation, the limited domestic market, and the generally disturbed political condition of the country. It is an accepted fact that Chinese ores are of excellent quality and are usually easily workable, so that if China finds means of overcoming the very serious obstacles now operating against its industry—excessive coke costs and lack of organization—and at the same time develops a local market for her finished products, she should in time consume a very considerable

CONSUMPTION OF RAW MATERIALS IN PRODUCTION OF IRON AND STEEL

(In metric tons)

Year	Iron ore	Manganese ore	Limestone	Coal for coke	Other coals	Coke	Pig iron	Ferro-alloy	Scrap iron	Iron sands	Charcoal
1918	1,065,930	136,973	373,157	1,184,667	1,182,562	820,010	492,702	8,197	560,317	33,981	118,606
1919	1,097,925	70,151	431,523	1,691,624	1,014,839	888,761	474,058	7,225	402,132	27,878	257,799
1920	1,248,146	48,826	533,472	1,604,446	1,269,770	818,032	500,720	26,051	493,190	6,708	167,962
1921	1,074,850	46,625	506,350	1,053,281	1,285,749	784,396	541,528	8,687	451,427	3,483	25,248
1922	1,181,718	39,442	477,253	1,366,221	1,078,047	680,742	604,331	13,788	454,614	580	7,545
1923	1,014,202	49,061	368,987	1,231,022	707,303	660,200	650,056	15,590	430,308	152	3,113
1924	991,653	64,332	368,801	1,339,633	779,637	636,124	731,706	14,563	494,352	466	3,380
1925	1,215,543	65,939	635,089	1,380,971	1,334,417	—	973,271	13,510	565,565	584	2,660
1926	1,437,395	76,096	448,078	1,438,409	1,366,682	775,545	1,033,977	15,851	659,295	185	1,664

part of her ore production. But should these conditions be met and the Chinese blast furnaces return to operation at their previous maximum rate, there would still remain a considerable tonnage of ore available for export, and the financial relations of Japanese interests with the Chinese iron-mining interests are apparently sufficient to assure a continuance of supplies from this region.

A steel industry of large proportions is not wanted or required in Japan or any other oriental country. The per capita consumption of steel in the Orient will probably never equal that of the United-States and other great industrial countries. The difficulty in maintaining a steel industry of moderate size in Japan lies in other factors than the supply of ore.

The question of supplies of raw materials in times of stress, when some of the normal supplies might be cut off, does not enter into this discussion of the normal economic aspects of the industry. In this connection, however, it might be said that the Yawata Steel Works plans on keeping a reserve supply of ore sufficient for one or two years' operation. As a matter of fact, the greater part of the supplies now received will be accessible in almost any emergency. The problem of increasing the ore supplies for a further expanison of the industry is, however, a pressing one, and it is the ambition of Japan to produce all its own steel.

The following tabulation shows the total amount of ore that Japan would need now if its iron and steel producing facilities were capable of supplying the entire iron and steel needs of the country. This table was computed by engineers of the Asano Iron Works.

Japanese Iron-Ore Requirements to Insure Complete Independence From Imported Iron and Steel

[Metric tons]

	1926	*1925*	*1924*
Ore production of Japan, including the supplies received from Chosen	229,412	183,633	194,649
Imports from foreign countries	792,830	1,103,709	1,065,132
Ore actually used by blast furnaces	1,437,395	1,205,543	991,658
Additional amount necessary to replace foreign steel	1,225,760	705,280	1,529,440
Additional amount necessary to replace foreign pig iron	332,974	340,950	555,704
Additional amount to replace foreign iron and steel	1,558,734	1,046,230	2,085,144
Amount of ore required for complete independence	2,996,129	2,261,773	3,076,802

The requirement for complete independence from foreign iron and steel imports is about 2,750,000 tons annually, based on the average for the three years, 1924-1926. The production of iron and steel in Japan at this maximum limit would not be economical. However, the above figures indicate the extent of the market for finished products, practically all of which are now actually made in Japan and which could be produced by an enlargement of existing facilities without introducing processes not already in operation.

As discussed in the section on coal and coke, one of the greatest obstacles to the economical production of iron in Japan is the high cost of coke. With blast furnace coke at over Y.15 per ton, it is difficult to see how pig iron can be produced economically, unless great savings are effected in labor or other factors. This appears to be the crux of the problem of the economical production of iron by the existing works.

Of course, it is the sum of raw-material costs that determines the economy of raw-material supply in steel production, rather than the separate cost of either iron ore or coke.

Coke, however, appears to be the variable factor in Japan and the one in which cost is most unreasonably and inexplicably high. This is particularly true in view of the fact that where foreign ores are used in any iron industry it is expected that ore costs will be high and that the ores will be brought to the point where coke is especially low in price and readily available. The Japanese works were located with this in view, and it is in this particular that they have failed to permit the realization of the aspirations of the founders of the works. The cost of coking coal has risen out of proportion to labor costs.

Comparative costs of raw materials used in pig-iron production in various parts of the world, taken from " *The Iron Age,*" to which have been appended figures for Japan and Manchuria, are as follows:

Cost of Raw Material Per Ton of Pig Iron

Countries	Ore	Coke	Flux	Total
United States:				
Lake furnaces	$7.85	$6.75	$0.50	$15.10
Pittsburgh furnaces	9.90	4.00	.60	14.50
Atlantic coast furnaces	9.50	8.00	.60	18.10
France:				
Lorraine	3.40	9.00	—	12.40
Luxemburg	2.40	8.40	—	10.80
Belgium	6.00	8.00	—	14.00
Germany (Ruhr):				
Swedish ore	8.70	4.60	.40	13.70
Lorraine ore	7.60	6.00	—	13.60
Great Britain:				
Imported ore	9.30	5.75	.60	15.65
Native ore	3.50	8.00	.20	11.70
Japan	8.50	8.50	1.00	18.00
Manchuria	5.00	5.00	1.00	11.00

The cost of production in India is said to be lower than in any of the countries listed above. This cost was recently stated to be about $11 per ton, including all overhead and manufacturing expenses.

Problems Affecting the Manchurian Iron Works

The Manchurian iron works constitute a separate problem. Here the major part of the ores for large-scale production must be concentrated before they are used in the blast furnace, and this process has just recently been put in operation on a commercial scale. It is too early to predict the financial results of this operation, although there seems to be little doubt that in any event the production will be carried on, as the South Manchuria Railway Co. is a semi-Government enterprise with large resources and is intent on making a success of the iron production.

With the Manchurian ore problem on the way to solution, the problem of coke became uppermost. Fushun coal is not a good coking coal and is at present being mixed with Penhsihu coal in the proportion of 80 per cent. Fushun coal to 20 per cent. of Penhsihu coal. Fushun coal costs about Y.7 per ton and Penhsihu coal Y.12 per ton. Experiments are being made in reducing the percentage of Penhsihu coal. This coke is cheaper than any obtainable in Japan. The cost of pig iron per ton produced at this plant is approximately as follows: Coke, Y.10 ore, Y.10 limestone, Y.2 and miscellaneous, Y.2.50 a total of Y.24.50.

The difficulty lies in the distance from markets. The following additional charges apply; Rail freight to the port of Dairen, Y.4 commission, Y.1.50 handling and loss in transit, Y.3 shipping freight to Japan, Y.2 export duty from China, Y.2 and import duty into Japan, Y.1.66 a total of Y.14.16.

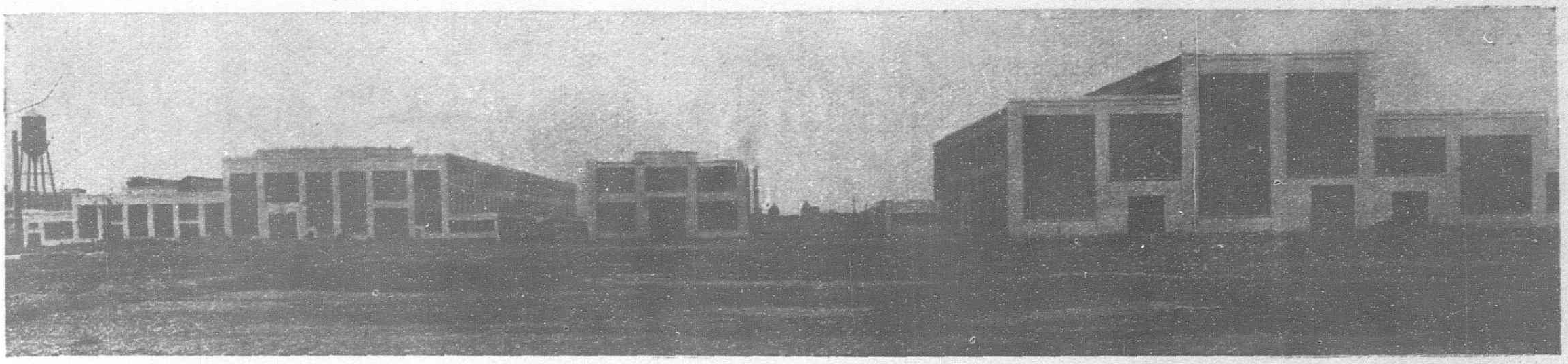
The total costs of Anshan (Manchurian) pig iron landed in Japan is thus about Y.38 per ton, in contrast to costs at the Kamaishi Iron Works (in northeastern Honshu), which uses in part Japanese and in part Chinese ores, of about Y.37 and those at Yawata (on the island of Kyushu), amounting to approximately Y.40 per ton.

Nanking-Canton Railway Planned

According to the construction scheme for the Nanking-Canton Railway Line formulated by the Construction Department of the Ministry of Railways, the proposed line will pass through the provinces of Anhwei, Chekiang and Fukien before entering Kwangtung.

The principal cities in Kwangtung through which the line will pass before terminating at Canton are Tapu, Chiayingchow, Hsingning, Wuhua, Lungchow, Hoyuan, Polo and Tsengcheng.

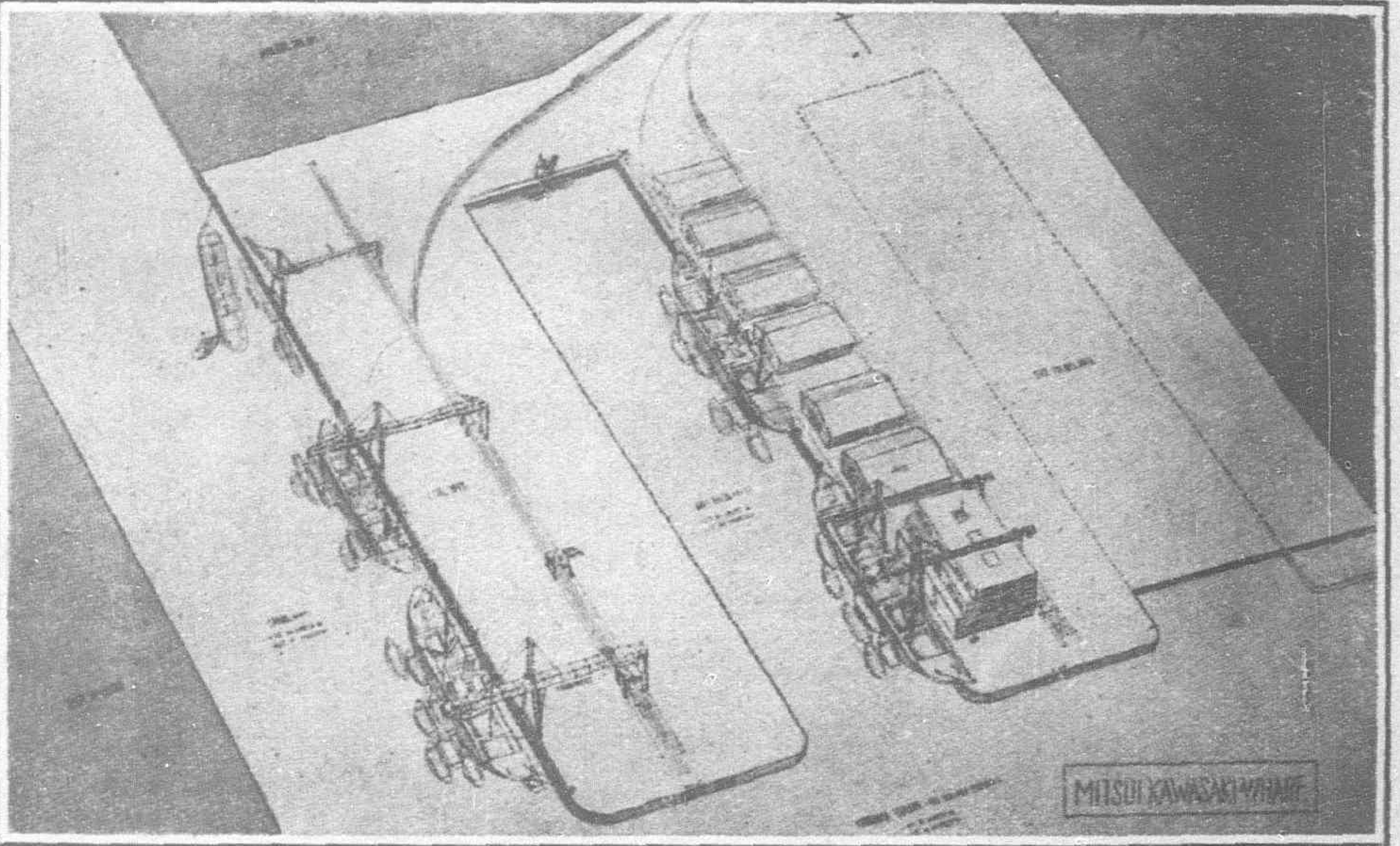
Four branch lines connecting Changshan (in Chekiang) with Hangchow, Yinping (in Fukien) with Foochow, Lungchow (in Kwangtung) with Shihhsien, and Chiayingchow (in Kwangtung) with Swatow, will also be constructed following completion of the trunk line.



The Shibaura Engineering Works, Erected in the Tsurumi Reclamation

The Keihin Industrial Zone

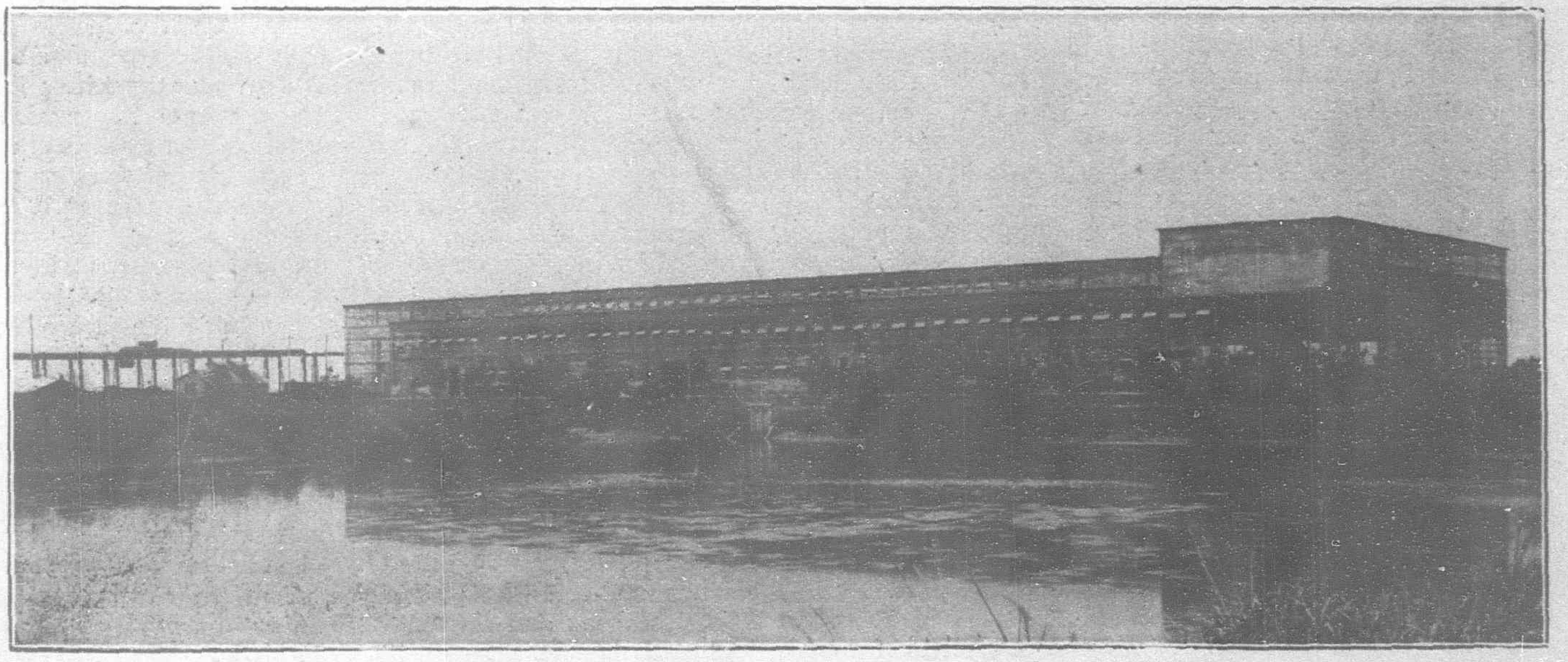
THE Reconstruction Number of THE FAR EASTERN REVIEW issued in July, 1925 very fully described all the leading engineering features of the plans for rebuilding Tokyo and Yokohama. Prominent among these undertakings was the projected Tokyo harbor and Tokyo Bay improvements which in time would convert the entire foreshore between Tokyo and Yokohama into one vast industrial district with its own dock, railway and canal system. Other pressing features of reconstruction have compelled the Government to postpone these port developments. but there are now indications that the plans will be proceeded with. A sum of Y.37,000,000 has been added in the budget to the present authorized appropriation of Y.9,500,000 for the construction of the Tokyo Harbor improvements and the dredging of a deeper ship canal down the bay to deep water that will enable vessels of at least 8,000 tons to dock at the capital.



Mitsui Wharves and Warehouses at Tsurumi

The most important development that has taken place along the Tokyo Bay foreshore is the reclamation of the industrial district known as Tsurumi. This is one of the Asano enterprises. The work was fully described and illustrated in the Reconstruction Number of THE FAR EASTERN REVIEW but since then many other large concerns have acquired land at Tsurumi, until to-day, it has developed into the most important industrial center in the Tokyo-Yokohama district. In describing this development, the Yokohama Chamber of Commerce says the coast land of Tokyo Bay between Tokyo and Yokohama including the reclaimed land of Kawasaki, Tsurumi, Koyasu and Namamugi, composes the great industrial district of the Keihin Industrial Zone, (Keihin is an abbreviation of the Japanese characters for Tokyo and Yokohama) most of which was amalgamated with Yokohama recently when the greater Yokohama City was organized.

This industrial zone is situated between two

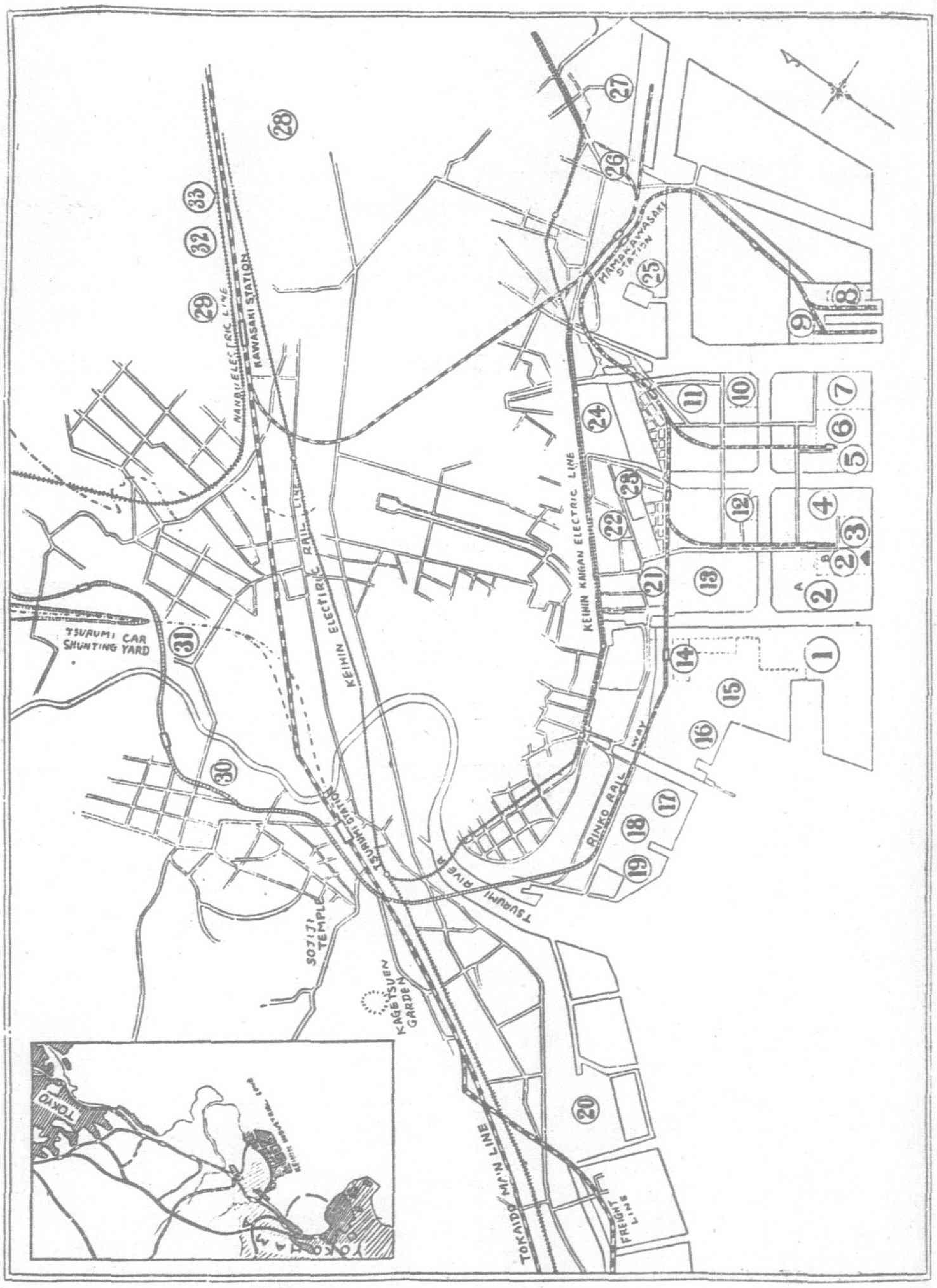


Factory of the Truscon Steel Company at Tsurumi big cities. It has good terminal facilities serving the area of reclaimed land of 4,950,000 sq. meters of the Tokyo Bay Reclaiming Co. and reclaiming land of 2,120,000 sq. meters of Yokohama City that is under construction. The principal leading factories are concentrated in the district along the coast, and any one who enters the port of Yokohama by vessel may easily command a great view of the industrial zone from the deck of his steamer as soon as the vessel passes the Hommoku Point.

The reclaimed land between the bar of the Tsurumi River and the Tama River is divided into nine districts, and the breakwater is constructed in front of the reclaimed land embracing a vast area of anchorage where 10,000 tons type of vessels may be entered and anchored without fear. There are many small canals running into the reclaimed land, and lighters transportation, connecting facilities between shore and vessels anchored or moored, and other terminal facilities and accommodations being almost complete, an ideal great industrial zone is gradually materializing.

In and around this reclaimed land many factories are scattered, and among them the following factories may be mentioned :—

The Nippon Carbon Co.
The Kirin Beer Brewing Co.
The Nippon Truscon Steel Co.
The Asahi Glass Co.
The Asano Iron and Steel Manufacturing Department.
The Asano Shipbuilding Yard
The Asahi Slate Co.
The Nippon Kokan Kaisha
The Asano Cement Co.
The Shibaura Engineering Works
The Nisshin Flour Mills
The Meiji Seika Kaisha
The Tokyo Denki Kaisha
The Morinaga Seika Kaisha
The Tsurumi Mokko Kaisha
The Nippon Petroleum Co.
The Meiji Sugar Refining Co.
The Tokyo Rope Manufacturing Co.
The Fuji Gas Spinning Co.
The Fuji Denki Kaisha, Etc., etc.



Keihin Industrial Zone and Vicinity

As regards railways, a branch line of the Government Railways stretches 2 miles 55 chains from the Tokaido Main Line at the Kawasaki Station to the Hama-Kawasaki Station in front of the premises of the Asano Cement Factory. Besides, a private railway belonging to the Tsurumi Rinko Railway Co. runs from the Hama-Kawasaki Station to the reclaimed land to the compounds of those factories that are situated in the reclaimed zone, and a trunk line is expected to be connected with the Tokaido Mina Line at the Tsurumi Station under the second extension plan.

Thus it will be seen that this industrial zone will be connected with the Tokaido Main Line from both Kawasaki and Tsurumi, and on completion of the shunting yard at Tsurumi which is the largest in the Far East, the position of the industrial zone will be most favorable since it will have an ample and direct supply of cars for use.

Among the facilities of the industrial zone the Mitsui Wharves are one of the most noticeable, owned and operated by the Mitsui Bussan Kaisha Ltd. These Wharves are situated at the northeast end of the port of Yokohama facing the projected Tokyo Yokohama Canal. It is nine miles from the Shibaura Pier, of Tokyo, and the area, including the compound, is 188,000 sq. meters. The area is divided into three sections ;—coal wharf, general cargo wharf and future extension area. Accommodations and facilities are amply provided. The work of the first period was completed this summer and the finished part has been working since August, 1928.

The west bank of the place, facing a canal of 180 meters in width is called No. 1 Pier. This pier is 400 meters in length with an open storage yard of 120 meters width, and is available for coal handling and storing. Four ocean-going vessels of 5,000 ton type can be moored at one time, and on the quay, there are three giant coal handling equipments of Bridge Transporter System, each 93 meters long and 24 meters high. The working of these machines is very efficient, *i.e.*, picking up the coal from the ship's holds and carrying it into the lighters inside and overside depositing it on land or loading it is the railway cars, and any operating work is a free convenience. The working capacity of each of these is about 2,000 tons of coal either loaded or discharged from or to ships per day.

Every Bridge Transporter has a moving crane on it and even when the machine is being operated the crane can be used for the work of loading into cars from the coal depôt or for trimming coal independently. This combined working system is the first trial in the world, and it is a matter of pride to have such a facility at the port of Yokohama.

A basin which is proposed to accommodate the general cargoes is situated at the east side of No. 1 pier, and its mooring bulkhead will be equipped with various modern cargo handling devices. This pier is now under construction and will be open for use in the near future.

The terminal facilities and various accommodations on the reclaimed land, and supplies of electric light and power, gas, water, are in sound condition ; moreover, facilities for mooring, anchoring, lights, beacons and day marks and the network of railways and highroads to connect with its hinterland are reaching completion, so that an ideal industrial zone is being realized.

The Growth of Shanghai's Waterworks

SHANGHAI'S rapid growth of recent years deserves to be ranked as one of the most phenomenal booms in the history of the Far East, or in the history of any large city in the world. A gain of more than 12 per cent. each year since 1921 is evidenced in the returns on consumption of water by the Shanghai Waterworks Company, Ltd., until now the consumption totals something over thirteen billions of gallons. To meet this demand the Waterworks Company has steadily added to its purification and pumping plant and to its distribution system with such success that the possibility of a water shortage is now never seriously considered.

The difficulties in supplying such a demand as occurs in Shanghai are considerable, due chiefly to the fluctuation of the demand, which is much greater in the summer, and reaches a heavy peak during the forenoon which is exceptionally pronounced on a fine day following a series of wet ones, so that the Company's plant must be capable of supplying the maximum demand at the worst moment of the worst day. In addition, the supply is taken from the Whangpoo River, which is probably as turbid and as unclean as any water it would be possible to find. The major difficulty here lies in removing the bacteria, which, on a bad day, reach approximately 20,000,000 in a tumbler full. The filter and purification works of the company remove an average of 99.99 and the water as it leaves the works compares favorably with that of any large city in the world, notwithstanding the unusually polluted source.

After purification the water is delivered to consumers by means of steam-driven pumps; the original pumps installed in 1881 had a capacity of 1,800,000 gallons per day, these pumps were housed in the building shown in Fig. 2 as No. 1 main engine house, which was extended to accommodate Nos. 3, 4 and 5 engines in 1891, 1904 and 1910.

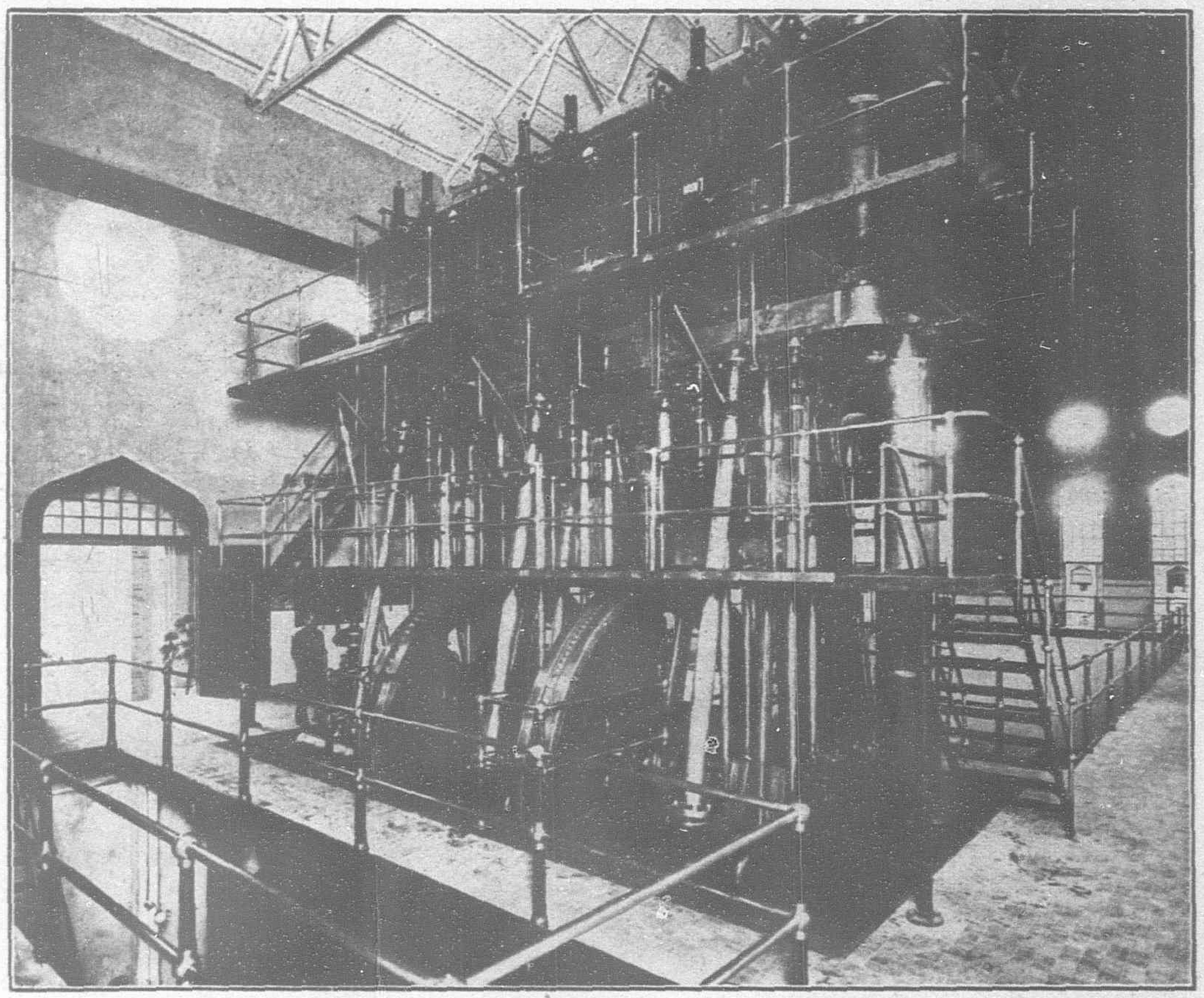


Fig. 1.—No. 11 Main Engine.—Front Elevation

A new main engine house, known as No. 2, was constructed in 1917 and was extended as demand increased until it now accommodates four large pumping units together with a battery of five Lancashire boilers.

In 1926 when it was necessary to further extend the main pumping plant the Company, after careful investigation, decided to break away from the type of pumps previously employed, horizontal plunger pumps driven by compound steam engines, and to adopt a vertical triple expansion engine driving three single-acting plunger pumps.

The new engine, the eleventh, was built last year and is capable of raising 14,400,000 gallons of water per day against a maximum head of 200 feet and, as will be seen from the photograph, is a very fine and imposing piece of machinery.

The advisability of adopting a steam turbine-driven centrifugal pump was carefully considered by the Company before placing the order for this unit, but it was found that the higher economy in steam consumption and greater reliability of a plunger pump more than offset the lower initial cost of and saving in space effected by the turbine-driven unit.

Steam for the new engine is provided by two water tube boilers with 3,500 and 2,200 square feet of heating surface, the smaller of which is capable of supplying all the steam required by the new pumping unit and auxiliary machinery.

These boilers, which maintain a pressure of 250 lbs. per square inch, are equipped with superheaters giving a total superheat of 200° Fah.

Fuel is fed to these boilers by chain grain grate stokers, at present hand-fed. Feed water is heated by "Green's" fuel economisers. Soot blowers, automatic feed regulators, high and low water alarms and all the most modern equipment have been provided. The boilers have been arranged for firing with oil in lieu of coal should occasion require.

Fig. No. 1 shows the engine and Nos. 2 and 3 the boilers and boiler auxiliaries.

The whole of the plant is housed in a new building abutting on No. 2 main engine house—shown in Fig. 2—space has been left for two additional engines of the same size as No. 11 and for sufficient boilers to supply them.

The building to house this engine was built to accommodate two more pumps of similar type, and boiler house accommodation was provided for the installation of boilers to drive a further five engines of the same capacity.

The foundations of these buildings with the necessary deep suction wells presented considerable difficulties which were successfully overcome. The engine foundations are entirely separate from those of the building itself, all being supported by heavy bearing piles. This work was further complicated by the proximity of heavy machinery which had to be kept in continuous commission during construction.

The whole of these works, details of which are attached, are to the designs of the Company's Engineer-in-Chief. The machinery was built under the supervision of the Company's Consulting Engineers: Messrs. John Taylor & Sons, Westminster. The detailed design and construction of the buildings, wells, foundations and contingent works and the erection of the whole of the machinery was carried out by the Company's own Engineering Staff.

The following are the details of the machinery installed:—

I.—Details of Pumping Plant—(see Fig. No. 2)—This engine and pump, constructed by Messrs. Worthington-Simpson Ltd., London and Newark, is of the vertical, open-fronted, triple-expansion, surface-condensing type, the water-end consisting of three single-acting, externally-packed plunger pumps, driven direct from the piston rod crossheads of the engine.

The pump is capable of delivering 14,400,000 gallons per 24 hours or 600,000 gallons per hour against a maximum head of 200 feet or a normal working head of 155 feet.

The following are the principal dimensions of this plant:—

High Pressure Cylinder	10 inches dia.
Intermediate ,,	31 ,, ,,
Low Pressure ,,	56 ,, ,,
Length of Stroke ,,	48 ,, ,,
Pump Plungers ,,	29 ,, ,,
Length of Stroke ,,	48 ,, ,,
Normal Speed	30 revs. per min.
Normal Piston Speed	240 feet per min.
Steam Pressure	250 lbs. per sq. in. at Boiler.
Superheat	190 degs. Fah.

II.—Travelling Crane.—Constructed by Messrs. Herbert Morris Ltd. Loughborough, has a span of 43 feet and a lifting capacity of 15 tons.

III.—Boilers (see Fig. No. 2—Constructed by Messrs. Babcock & Wilcox Ltd., London and Renfrew.

The following are the details of these boilers:—

	Larger boiler		*Smaller boiler*
Total heating surface	3428	sq. ft.	2197
Total steam capacity	13000	lbs. per hr.	8000
Steam pressure	250	lbs. per sq. in.	250

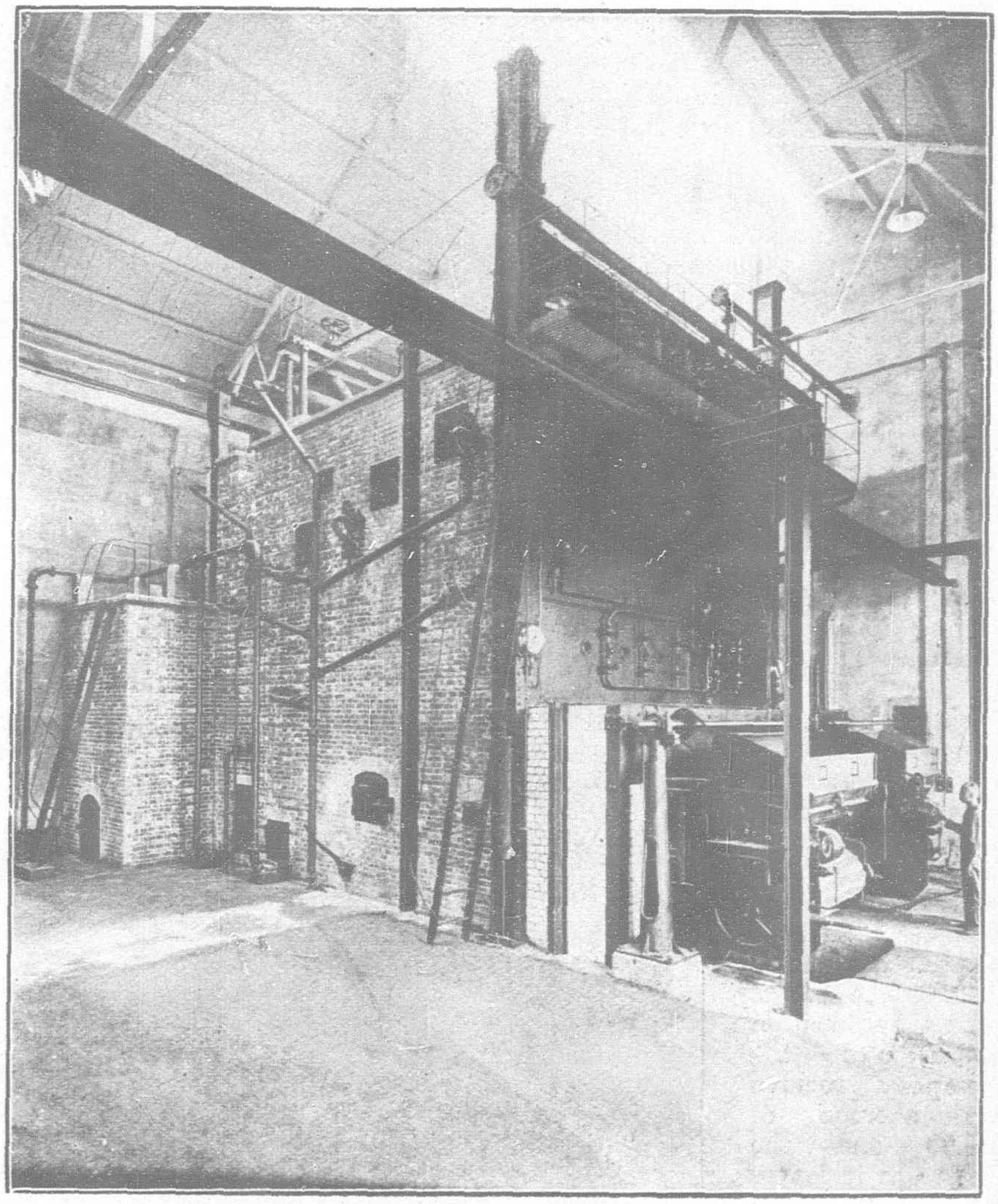


Fig. 2.—Nos. 17 and 18 Water Tube Boilers

These boilers are fitted with:—

- i. Mechanical Chain Grate Stokers.
- ii. Integral Type Superheaters.
- iii "Mumford's" Feed Water Regulators.
- iv. Calorised Diamond Mechanical Soot Blowers (for external cleaning of tubes.)
- v. Steam Atomising Oil Firing Equipment.

IV. Boiler Auxiliary Plant (see Fig. No. 3—The following machinery has been provided:—

- i. Messrs. E. Green & Son's Fuel Economiser of 120 pipes enclosed in steel casing.
- ii. Messrs. Worthington-Simpson's Standard Vertical Single Cylinder direct acting Boiler Feed Pumps.
- iii. 40-in. diameter Induced Draught Fan driven by Messrs. Reader & Son's steam engine (totally enclosed).
- iv. The flues are fitted with The British Vacuum Cleaner & Engineering Co.'s Vacuum cleaning plant for soot removal.
- v. The "Auto" Recorder Co.'s Co_2 Recorder.

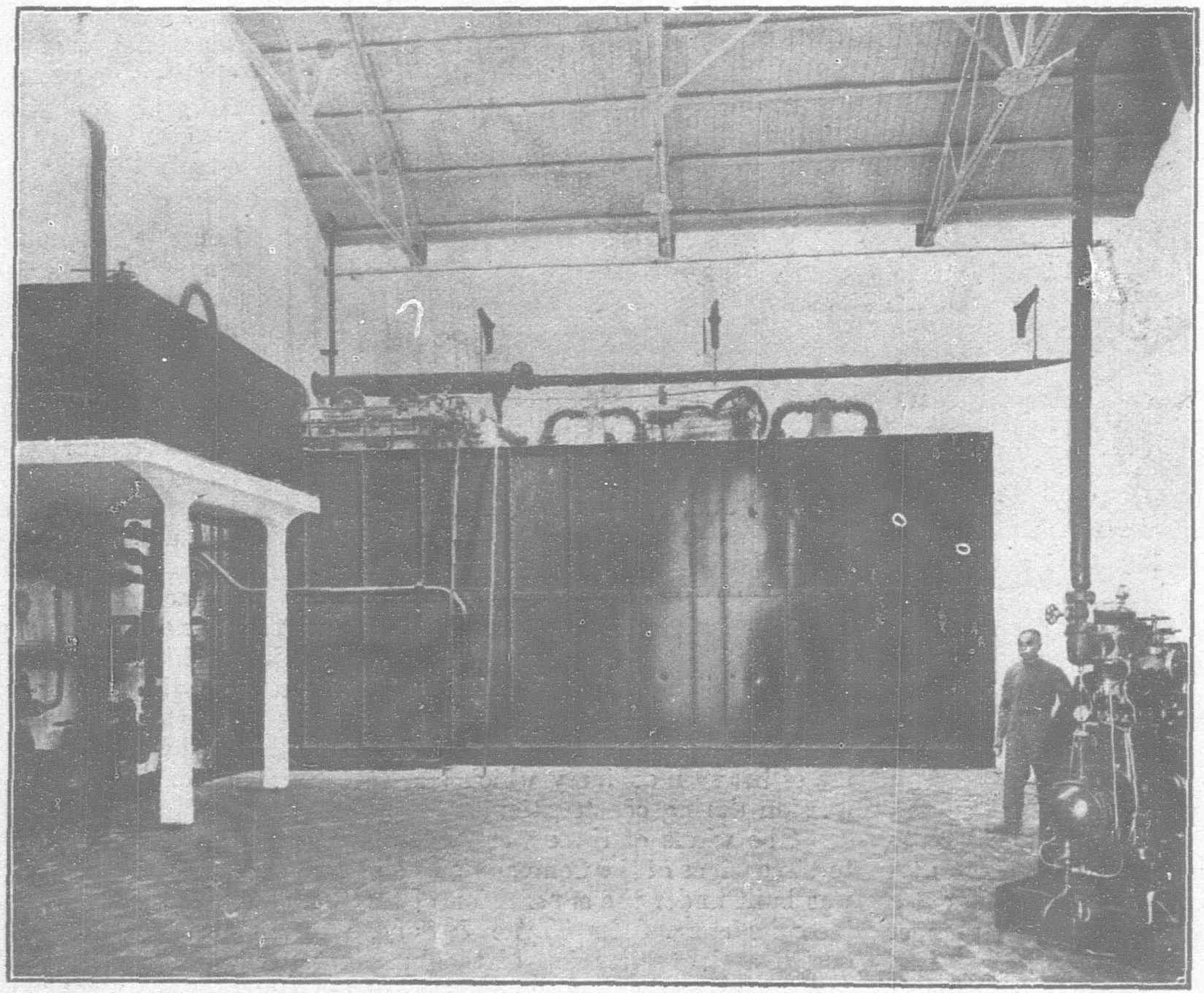
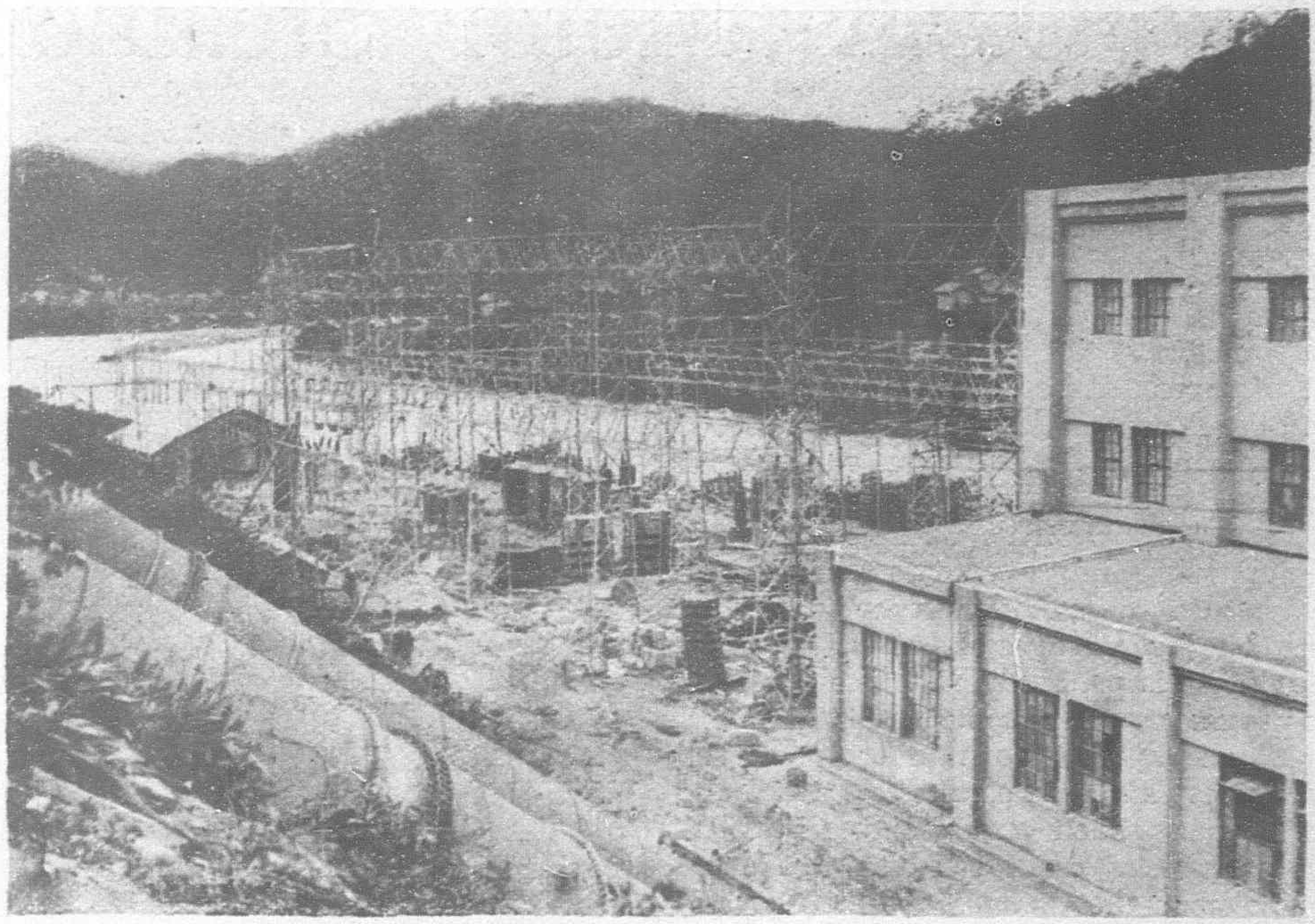


Fig. 3.—Blower Room.—Showing Stoker Engine and Feed Pumps on Left, Economiser Casing and Engine in Centre and Blower Engine and Fan on Right

The Kumami Power Station

A Power Station Equipped Throughout with Machinery and Apparatus Made in Japan

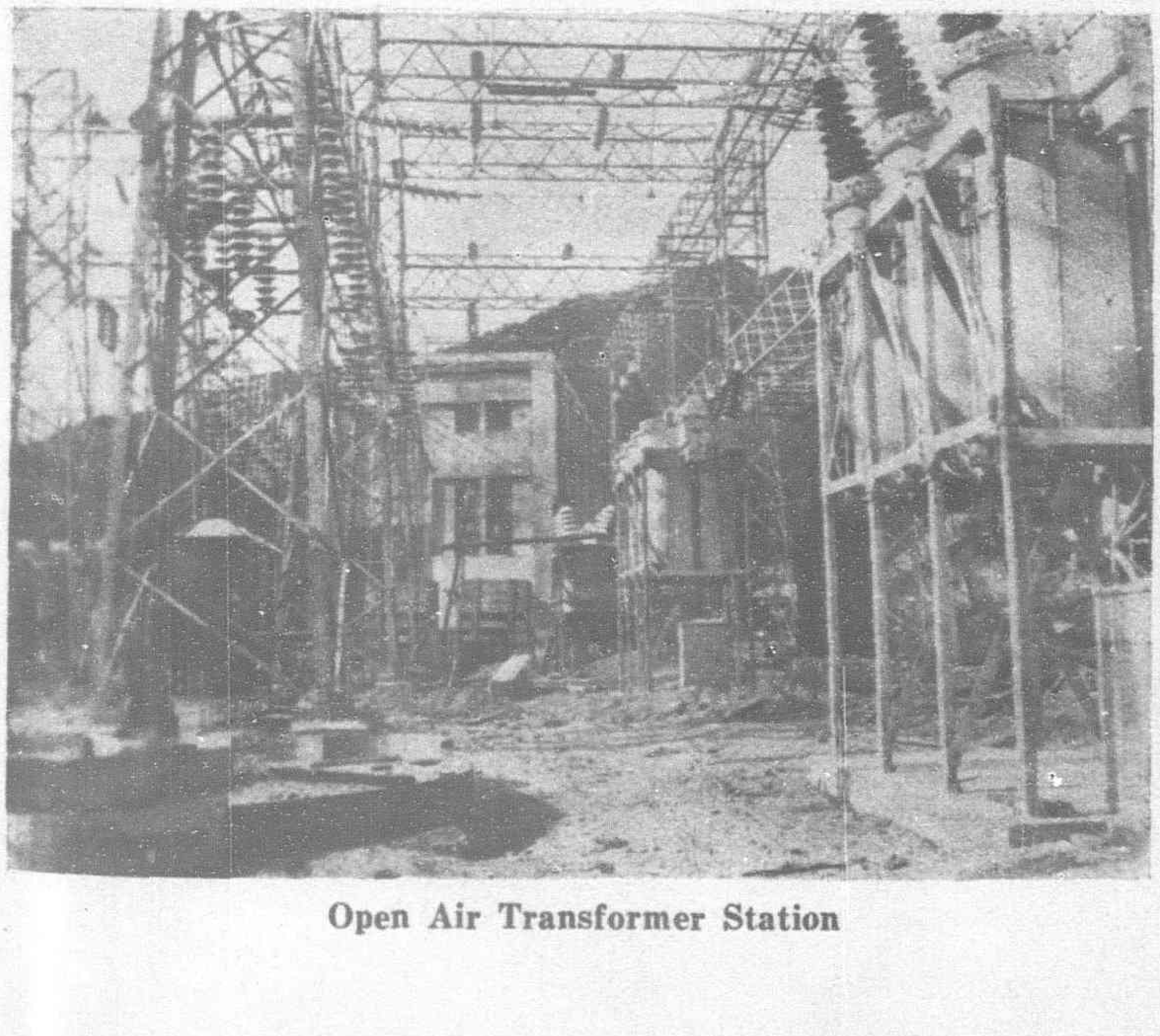
THE Kumami Power Station of the Hiroshima Electric Light Co., Ltd., is located at Kumami, Futamigun, Hiroshima Prefecture. The plant, deriving power from the Kaai river, a tributary of the Gono river, is equipped throughout with machinery and apparatus made in Japan. The two penstocks, with an inner diameter of 12 ft. and a length of 138 ft. each were turned out by Sakai Iron Works and the two water turbines by the Dengyosha Company of Tokyo. These turbines are of the vertical single spiral Francis type with a capacity of 8,700 h.p. at full gate opening. The speed is 221.76 r.p.m. The alternating generators, two in number, are of the vertical revolving field type of 6,875 K.V.A. capacity each, with a power factor of 80, three phase, 60 cycles, 11,000 volts and 211.76 r.p.m. manufactured by the Shibaura Engineering Works. The exciters, two in number, are also from the Shibaura Engineering Works. These have a 80 K.W. capacity each, 220 volts and 211.76 r.p.m. The four main transformers (one in reserve) from the Shibaura Engineering Works are of single phase, 60 cycles, 4,800 K.V.A. capacity. They are delta connected in both high and low tension sides, and oil cooled. The switching apparatus and switchboards were also supplied by the same company. There is a Dengyosha new type governor driven by a 25 h.p. induction motor.



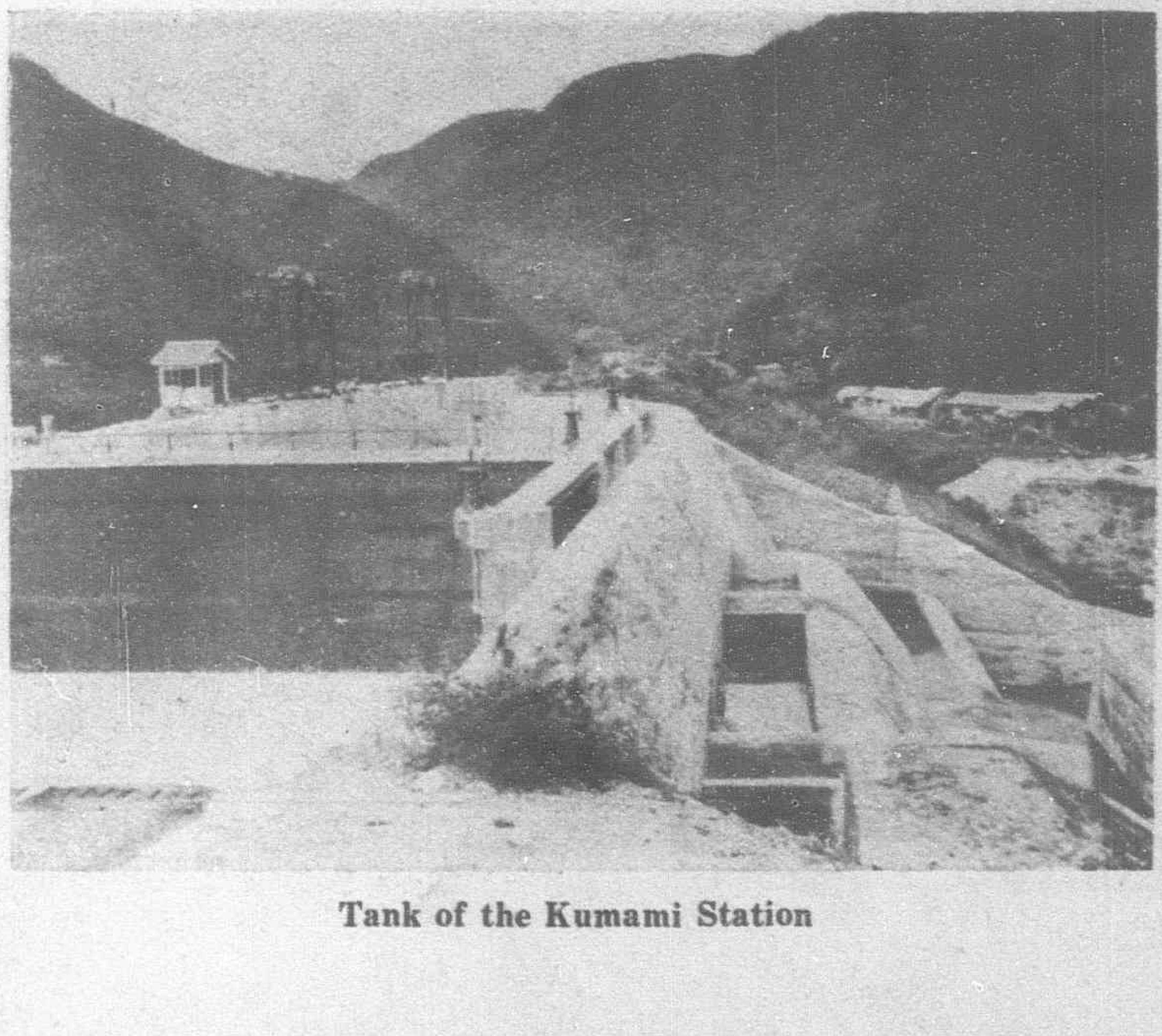
The Kumami Power Station

The intake for this plant is placed at Onaruse on the Kaai river. The total length of the power canal with a gradient of 1-2,000 is about 25,800 ft. consisting of one tunnel, one open canal and one conduit. The length of the tunnel is about 8,770 ft., and of horseshoe type with a height of 16 ft. and width of 17 ft. The conduit is of the same type as the tunnel, and is about 7,935 ft. in length. The length of the open canal is about 7,090 ft. with a height of 16 ft. The width at the top is 19.9 ft. and at the bottom, 12.4 ft. There are two regulating gates, No. 1 and No. 2, and each is provided with Stoney system iron leafs.

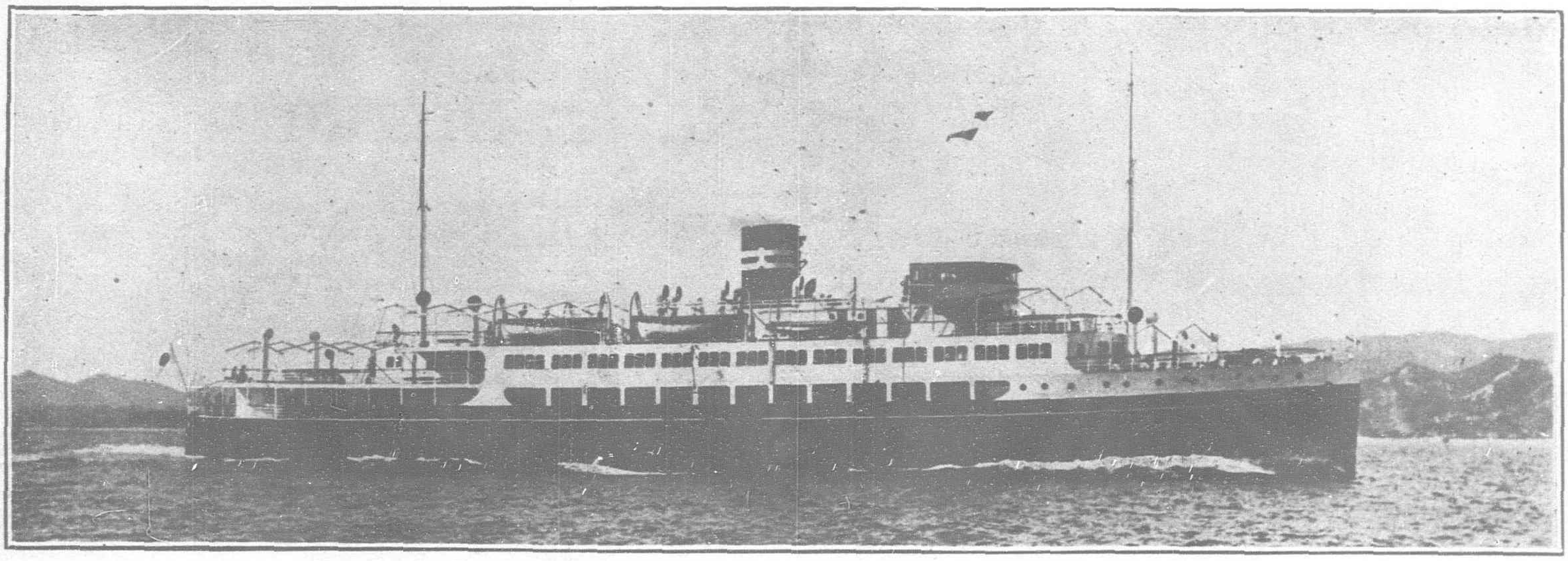
The effective head is 99 ft., and the available quantity of water is 1,000 cubic ft. per second. Its total generating capacity is 11,000 k.w. The current generated at the power station is boosted from 11,000 volts up to 55,000 at the open-air transformer station and is transmitted to the Hiroshima Substation, a distance of 65.5 kilometres.



Open Air Transformer Station



Tank of the Kumami Station



New Osaka Shosen Kaisha, 1,700-ton M.S. "Midori Maru," for the Osaka-Beppu Run

New O.S.K. Motor Steamers

THE new O.S.K. Inland Sea liner *Midori Maru*, 1,700 tons, which, together with her sister ship *Sumire Maru* of the same size, has been under construction for some time past at the Mitsubishi Dockyard at Kobe, has just been completed and set out on her maiden trip from Osaka to Beppu on December 5, 1928. The *Sumire Maru* is to be completed about the end of January.

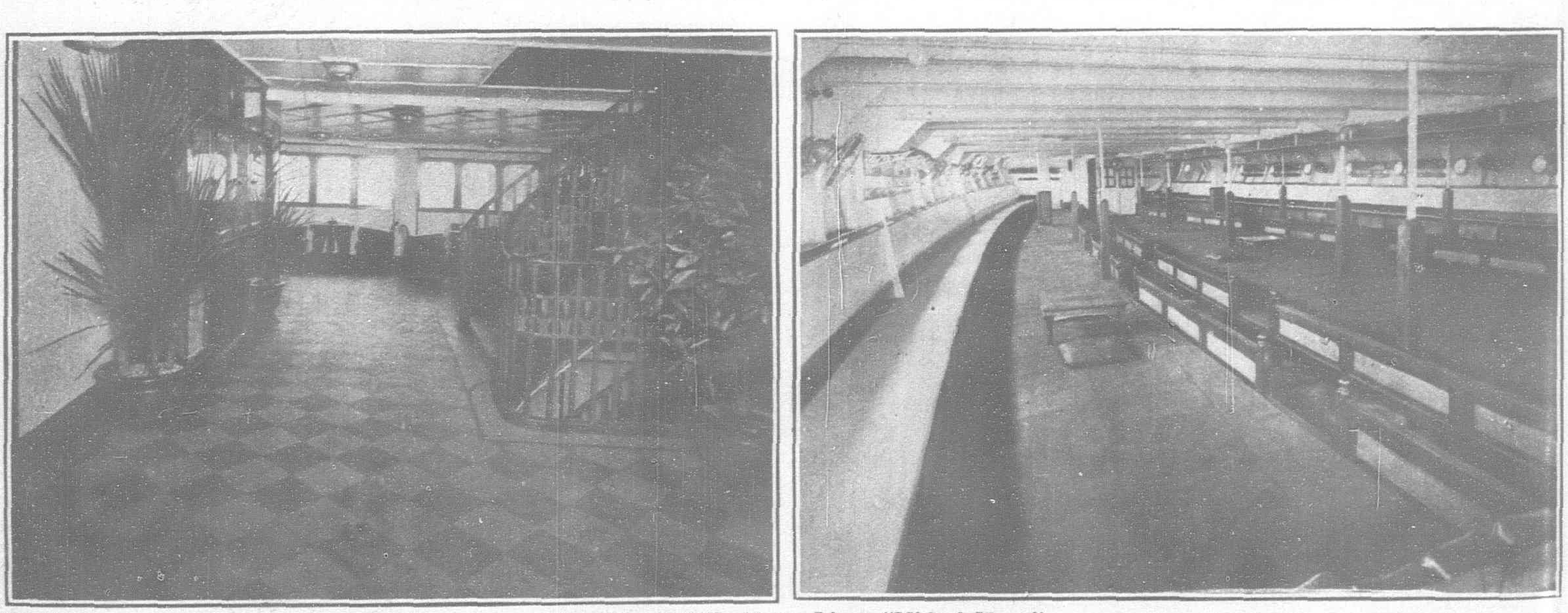
This company has hitherto operated two 1,600 tons passenger boats, the *KurenaiMaru* and the *Murasaki Maru*, and also, a 1,000 ton cargo boat *Yashima Maru* on the Osaka-Beppu run. With the completion of the foregoing two ships, which are equipped with two Vickers Diesel engines each, the O.S.K.'s Osaka-Beppu passenger service is going to be materially improved, two each of these popular passenger liners leaving Osaka and Beppu every day.

The increase in the frequency of voyages of the O.S.K. liners between the two Inland Sea ports is primarily with the object in view of accommodating the passengers traveling between the Osaka-Kobe district and the Kyushu island, whose number is growing especially since the Government Railway connecting Oita and Kumamoto cities in Kyushu was opened on December 2, 1928. The strong point of this run is that it saves a great deal of time and expenses of travelers going between the Osaka-Kobe district and the western parts of the Kyushu island, in their making sight-seeing journey in Kyushu at large, mountaineering at Mount Aso which claims to have the largest crater of all the active volcanoes in the world, and round of visits at the hot springs of Beppu, Dogo, and elsewhere in Kyushu.

Salient features of the sister ships *Midori Maru* and the *Sumire Maru* are as follows:

Gross tonnage	1,720 tons
Length	256 feet
Width	38 ,,
Depth	19.6 ,,
Speed	16.5 knots
Main engines	2 Vickers diesel engines
Power	2,800 h.p.
Accommodation:	
1st class	46 passengers
2nd class	148 ,,
3rd class	535 ,,

The O.S.K. authorities announce that they paid special attention in every minute point in the design of these new Diesel engined liners, based on their experiences derided from the operation of the *Kurenai Maru* and *Murasaki Maru*.



The New O.S.K. Motor Liner "Midori Maru"

Hallway of the First Class Saloon

Third Class Accommodations

Engineering Notes

ELECTRIC LIGHT, POWER AND TRACTION

ELECTRICITY EXTENSION IN HONGKONG.—The interesting announcement was made at the annual general meeting of the China Light and Power Co., Ltd., that the Company is on the eve of closing an agreement with the Government for the supply of electricity to the New Territories, Hongkong, which it is hoped will, in course of time, prove a profitable source of revenue.

HANSHIN SUBWAY PLAN APPROVED.—The Osaka-Kobe Electric Railway Company, familiarly known as Hanshin, has a plan of building a subway from Iwaya to the new Sannomiya Government Railway station, a distance of about two miles, at an estimated cost of Y.6,000,000. This plan was formally introduced in the session of a special committee of the Kobe Municipality, was approved subject to some conditions.

ELECTRIC GLOBES.—The consumption of electric lamps in Japan has been steadily increasing every year, and at present the demand is estimated at some 50,000,000 units a year. Until the close of the Meiji Era (1912) carbon filament was most in favor, but since then tungsten has been gradually replacing carbon. The appearance of incandescent lamp gave a vital blow to vacuum lamps and the contrast is like that between carbon and tungsten more than a decade ago.

AIKOKU DENKI K.K., (Aikoku Electric Co., Ltd.)—In order to manufacture incandescent lamps invented by Dr. Eiji Aoyagi, of the Kyoto Imperial University, a new company has just been established, with a capitalization of Y.300,000, all paid in. The new company is to succeed the business of the former Nagamine Denkyu K.K. The management of the company includes: Masaji Masuda of Osaka as president, Fumio Nagamine as managing director, Hisayoshi Imamura and Kenichiro Mochizuki as directors.

NEW POWER PLANT FOR KONGOSAN RAILWAY CO.—It is reported that the hydraulic power plant of the Kongosan Electric Railway Company, under construction at Kosenri and its equipment have recently been completed and examination of them by the Communications Bureau was finished recently. It may be noted that the total power generated by the Company is over 10,850 kilowatts.

SANYO CHUO SUIDEN K.K., (Sanyo Chuo Hydro-Electric Power Co., Ltd.)—The construction of Narihagawa Power Station, capacity 12,000 k.w., was completed before the end of last year and operation was permitted on December 31. Principal equipment consists of 3 units of 5,000 k.v.a. generators made by Dengyosha and Shibaura Seisakujo, 4 units of 5,000 k.v.a. transformers, etc.

KEIHIN DENRYOKU K.K., (Keihin Electric Power Co., Ltd.)—The Yugawa Power Station of Keihin Denryoku K.K.—located on the Yugawa River, a tributary of the Sai River on the upper reaches of Shinanogawa—was completed in November last year. Power from this station—capacity 6,000 k.w.—is to be sold to Tokyo Dento K.K., together with the output from other stations 18,000 k.w. Nagawa, 2,950 k.w. Oshirakawa, and 2,100 k.w. Maekawa Stations.

WAHAGI SUIRYOKU K.K., (Yahagi Water Power Co., Ltd.)—The deferred construction of Tateishi Power Station, located in Mitsuho Mura, Shimo Ina Gun, Nagano Prefecture, has just been started. The plan was delayed due to prolonged negotiations with Mitsuho Mura for compensation constract. The capacity of this new station will be 6,000 k.w.

AOMORI DENTO K.K., (Aomori Electric Light Co., Ltd.)—The construction of Yabestu Power Station of Aomori Dento K.K. was completed in December and passed the inspection of the Department of Communications. Another plant, Kansuizawa, is completed except for a part of earthwork which is now interrupted on account of extreme cold.

HAKUSAN SUIRYOKU K.K., (Hakusan Water Power Co., Ltd.)—Power generated at Torigoe Power Station of the company is to be transmitted to the new Yoshinotani Substation just completed near the Yoshinotani Power Station, and from there the voltage is to be brought up to 77,000 v. to be further transmitted to Daido Denryoku's system. Yoshinotani Substation is equipped with 5,000 k.v.a. transformers and switchboards manufactured by Shibaura Enginnering Works.

INDUSTRIAL

COAL LIQUEFACTION LABORATORY.—With regard to the liquefaction of coal projected by Mr. Yutaka Noguchi of the Nihon Chisso Hiryo Kaisha (Japan Nitrogenous Manure Company) in Kanko, it is understood actual investigation is at present being made and carried on and on completion a big laboratory will be established at a cost of about 1,500,000 *yen* or 2,000,000 *yen* in Seiko District, Kanko, about April next. It is understood that in accordance with the result obtained by the laboratory a company with a capital of about 30,000,000 *yen* will be established.

DAI NIHON JINZO HIRYO K.K. (Japan Artificial Fertilizer Co.) Superphosphates.—For some time the company has been carrying on experiments in manufacturing superphosphates with a high degree of 30 per cent. soluble at its Onoda Factory, in Yamaguchi Prefecture. It is reported that the experiments have been successful and a plan to manufacture 60,000 bags a month has been carried out. Formerly manufactures in the Kwanto were of 19 per cent. of the Kwansai 15 per cent. It is hoped that exports to China will increase, in view of the geographical advantage of Onoda Factory.

HOKUYETSU SEISHI K.K. (Hokuyetsu Paper Mfg. Co., Ltd.)—The company is installing a 110 inch paper making machine at its Niigata Mill, to replace an old machine. The new machine was bought from the Government Printing Bureau. When the installation is completed, it will be devoted to the manufacture of printing paper, chiefly to supply "Yen Library" publishers.

NIPPON SEKIYU K.K. (Japan Petroleum Co., Ltd.)—Mr. Nakano, chief of the mining department of the company, is now in Formosa on an inspection trip. He expects to stay there about three weeks investigating as to the plans for developing oil fields in the territory. Consumption of oil in Formosa has been increasing rapidly and imports are rising.

RAILWAYS

STEEL SLEEPERS.—An initial order for 70,000 steel sleepers equalling 5,000 tons of steel has been placed with a British firm by the Southern Railway, which is the first British company to adopt the steel sleeper in preference to timber. The supply ordered will enable about 35 miles of selected track to be equipped over a period of two years.

The rising price of imported timber sleepers, whereof 4,000,000 are used annually on British railways, is the chief reason for the change, but the Southern Railway is also guided by a desire to help British industries and to experiment with the new sleepers already in use in some places abroad, where it is estimated their life will be about thirty years against twenty years in the case of timber sleepers. In view of these circumstances it is believed that steel may in the end prove more economical.

NEW RAILWAYS IN MANCHURIA.—Various new railway lines have been projected. One of these is the Mukden-Fakumen line, which is probably intended to be extended further northwest to Chengchiatun, thus affording Mukden direct communication with Tsitsihar, without having to use the roundabout way over Tahushan. It is reported that $30,000,000 is to be raised for this purpose, one-third each by the Government, the principal banks and public subscription. Another railway is being planned from Hailungchang E. S. E. to Fusung and a surveying party has already been sent out by the Mukden-Hailungcheng Railway Construction Office. A third new railway scheme is said to aim at nothing less than traversing the whole of Eastern Kirin by a railway extending from Kirin Ne, across the C.E.R. to Fangcheng on the Amur River, for which purpose $80,000,000 is to be raised.

SIAM'S RAILWAYS.—A number of important orders have recently been received by British firms in this country from the Siamese Royal State Railways. An order for 30 third-class coaches with steel bodies has been placed with the Midland Railway-Carriage and Wagon Company, Birmingham; an order for 20 third-class coaches with wooden bodies has been placed with the Metropolitan Carriage, Wagon, and Finance Company, Birmingham; and another for 16 first-class coaches with wooden bodies has been placed with the Cravens Railway-Carriage and Wagon Company, Sheffield. These orders were obtained in face of foreign competition. The whole of the stock is to be built under the inspection of Messrs. C. P. Sandberg, of London, the consulting and inspecting engineers for the Siamese Government. The contracts have been placed by H.R.H. Prince Purchatra, the Minister of Communications for Siam, who will shortly visit England.

YELLOW RIVER BRIDGE REPAIRED.—An official report by Mr. A. J. Hearne, of the Ministry of Railways, states that the Yellow River bridge is now completely repaired and through traffic on the Tsinpu railway is possible as soon as arrangements have been made with the Japanese.

A test train of four cars under Mr. Hearne's direction and carrying the foreign Consular body and Japanese civil and military authorities and also over 50 prominent guests, successfully crossed the Yellow River bridge on January 20. Resumption of work in the Tsinan workshops has been sanctioned by the Japanese so long as they are notified of the nature and outline of the work.

Within three weeks two locomotives can be repaired there. The first lot of rolling stock released is made up of two locomotives (one damaged), four passenger cars and ten goods wagons. All were conveyed to Taian and will reach Pukow soon.

Running a train between Pukow and Tsinan requires six locomotives and 100 goods wagons. Mr. Hearne has been instructed to remain in Tsinan to continue negotiations. Japan is ready to discuss resumption of through traffic but has conditions to impose regarding through goods traffic. The Shantung Commissioner for foreign affairs and the Japanese Consul and railway representative are negotiating on the same matter.

PUBLIC WORKS

PHILIPPINE PORT DEVELOPMENTS.—The improvement of existing harbors such as Aparri, Cagayan, and Davao, Mindanao, and the development and opening of new ones such *as Mati, Davao ; Jimenez, Misamis ; Parang,* Lanao ; and Dipolog, Zamboanga, have tentatively been approved.

To determine the practicability of carrying out schemes for shipping development in the Islands, the harbor board agreed to send its technical committee next on a trip of investigation in northern Luzon to study port conditions. The main objective of this trip of investigation, however, will be to determine drawbacks to shipping in Aparri, principal port of northern Luzon.

NEW BANGKOK BRIDGE.—The Bangkok Karn Muang states that the Committee in charge of the Phra Buddha Yawt Fa Memorial entrusted His Royal Highness the Minister of Commerce and Communication with the preliminary arrangements in regard to the Bridge across the Menam Chao Phya.

His Majesty the King has decided to have a bridge constructed across the Chao Phya River to the south of the Rama VI. bridge, as a memorial to the founder of the Dynasty to be opened in April, 1931, on the occasion of the completion of 150 years since the establishment of Bangkok as the capital of the country. The Government will receive representatives of various companies from England, France, Germany, the Netherlands, Belgium, Italy and America, and will pay the expenses of their coming to Bangkok in order to be able to tender for the construction of the bridge. The bridge would be of the same length as the Rama VI. bridge, and wide enough to let four vehicles cross side by side. The passage in the middle will be from 100 to 120 metres and will open to enable large steamers to pass. The side passages must be wide enough for middle-sized steam vessels to pass easily.

LONGEST BRIDGE IN ORIENT COMPLETED.—The distinction of the longest bridge in the Orient, which hitherto has been enjoyed by the railway bridge over the Yalu River, which connects the Mukden-Antung Railway with the Chosen Railway, will now be shifted to the iron bridge constructed over the Yoshino River in Tokushima Prefecture. The entire length of the *bridge is 3,511 feet, with a width of 20 feet.* It has two main supports and 16 subsidiary ones. The construction took three years to complete, at a cost of Y. 1,138,000, of which Y. 950,000 was borne by the Imperial Government, as it is on a national road.

As the bridge connects three provinces of Shikoku, it is to be named " Mikuni Bashi "—Three Province Bridge.

NEW AMERICAN CONSULATE IN SHANGHAI.—Work will be commenced shortly on the demolition of the buildings of the American Consulate in Shanghai, and in their place new structures, built on modern lines and large enough to house all official departments, including the United States Court for China, will be erected, it was learnt. The cost of the new buildings is covered by an appropriation of G.$750,000 recently voted by Congress.

Mr Trumble, the architect, was unable to say when the buildings would be ready, but he declared public tenders will be called for shortly and demolition of the present buildings should start very soon. It will take about a year to complete them.

AVIATION

RYAN AEROPLANES.—Five Ryan aeroplanes of the same type as used by Col. Lindbergh on his Atlantic flight, will be used by the Wuhan Civil Aviation Association of Hankow in the proposed establishment of a passenger and goods airline to Canton.

The planes are Ryan Brougham type powered with single motors of 250 horsepower and are so equipped as to carry five passengers or 1,600 lb. of freight.

JAPAN'S AIR PASSENGER SERVICE.—Japan is preparing to start from April this year a regular air passenger service between Tokyo, Osaka, Dairen and Shanghai. Fokker 8-seaters and 4-seaters, altogether eight airplanes, will reach Osaka early in March from Holland. *The Japanese service as it is destined to extend* over to the Chinese continent, is considered highly important, especially the one going through Chosen to Dairen.

This line will eventually extend from Dairen to Mukden and Harbin and farther north to Irkutsk where it will connect with the proposed Russian air service that starts from Kazan to Irkutsk, *via* Tomsk, and complete the air connection between Japan and Europe.

TELEPHONE, TELEGRAPH AND RADIO

BANGKOK-BERLIN RADIO.—Bangkok's new wireless station communicating direct with Berlin has been opened.

AUTOMATIC TELEPHONE.—The automatic telephones having demonstrated their high efficiency in Manchuria, with its mixed population and languages, the C.E.R. is planning to replace the existing telephone service at various station along the line with the automatics.

The stations of Pogranichnaya, Manchouli and Hailar are to be provided each with an installation of 1,000 circuits.

FUSHUN COLLIERY TOWN.—The new Fushun Colliery Town opened the new automatic telephones to public traffic on February 3 .

Out of 519 subscribers, about 80 per cent. of them have had necessary technical connections effected.

The new installation, put to the test several times, has acquitted itself well.

MODERN TELEGRAPH POLES.—The Chinese section of the Canton-Kowloon Railway has decided to replace all wooden telephone poles along the permanent way with reinforced concrete ones. The work will be spread over five years and the most decrepit poles will be replaced first. The total number of concrete poles will be 2,800 and the total cost of the job will be $78,000 Canton currency. This will be jointly shared by the Canton-Kowloon Railway and the Canton Telegraph Office. About 500 wooden poles will be replaced each year and the annual sum appropriated for the purpose will be $16,000. This means that the Railway and the Telegraph Office will each have to pay $8,000 a year for five years. This cost includes all the china insulators and the longitudinal iron bars. Six wires are expected to be taken by the new poles, half of which will belong to the Canton Telegraph Office.

CANTON TO EXTEND PHONE SERVICE—*To facilitate telephonic communication through*out the province of Kwangtung, the Kwangtung provincial reconstruction department is formulating a plan for the installation of a long-distance telephone system with a number of main and branch lines radiating from Canton to various important cities.

It is announced that a line connecting Canton and Hongkong will be first installed at an estimated cost of $183,600, including $143,100 for the installation of the wires, $19,000 for the building of the main administration office at Canton and $11,500 for a branch administration office at Hongkong. The budget has been prepared by the reconstruction department and approved by the Provincial Department of Finance. Six equal instalments of $30,600 have been authorized to be appropriated from Treasury.

In addition to the Canton-Hongkong line, four other lines are also under contemplation, namely, the Canton-Swatow, Canton-Shiuchow, Canton-Shiuhing and Canton-Kiangmen lines, at a total estimated cost of $308,900.

UNDERGROUND RAILWAY IN NAGOYA—An underground railway project with an authorized capitalization of $15,000,000 is in contemplation for Nagoya by the Aichi Electric Railway Company and the Nagoya Railway Company as promoters. The scheme is *to connect by a subway system the projected* terminal of the Nagoya Railway at the Nagoya station of the Governement line with another proposed terminal of the Aichi railway at Atsuta.

RADIO IN THE PHILIPPINES.—With the governor general's final approval of franchises granting operation of radio communication between the Philippines and the United States to both the Dollar Steamship Lines and the Mackay radio and telegraph interests, both of those companies announced that they were proceeding with plans to bring equipment to be the Philippine Islands for establishing communication as soon as possible.

The Mackay interests, which control the Postal Telegraph system and the Commercial Pacific Cable system will take immediate steps to acquire property for sending and receiving stations in the vicinity of Manila, it was announced by representatives of the company. They will be ready for operation in approximately six months.

The Dollar company is establishing similar equipment as soon as it is possible to do so, and their operations, according to a definite statement made by Edgar Wilson, representative of the company sent out here for the purpose of guiding the franchise through legislative and governmental channels, will not be confined to private business but will be devoted to commercial transmission.

SHIPPING AND SHIPBUILDING

A JAPANESE CARGO SHIP.—One of three motor vessels under construction by the Mitsui Bussan Kaisha, Ltd., to their own account, the *Hakubasan Maru*, a ship of about 8,000 tons deadweight has been launched. Having a length of 435-ft., a beam of 56-ft. 5-in. and a depth of 33-ft., the *Hakubasan Maru* is equipped with a pair of eight-cylinder single-acting four-stroke engines constructed by Burmeister and Wain.

FISHERY SCHEME IN JAPAN.—Organization of a fishery company under the name of Kokusai Kosen Gyogyo Kabushiki Kaisha is under contemplation among leading business men of Japan, the chairman of the organizing committees being Mr. Seinosuke Go, prominent in Japan's *commercial community. The capitalization* is to be Y.30,000,000, half of which it is understood is to be invested by British interests, the balance to be locally offered for public subscription. The organization meeting is expected to be held in Tokyo in the near future.

The plan of the company is entirely new in Japan, in that the vessels belonging to it will be engaged in fishing operations in the North Sea and Bering field, and the fish caught will be treated on board the ships so that the product will be *disposed of as oil, manure, cattle food in the* European market.

It is reported that the new fishery company is now looking out for three three-decked vessels of 10,000 tons deadweight for its operations. Since the enterprise is to be joined in by British concerns, however, the field of choice of these vessels has been extended to the overseas market and it is understood that a shipping agent in Kobe is searching in the London market for suitable vessels.

Besides these mother ships, the company is to have several oil tankers, 15 trawlers and also about ten fleets consisting of small craft to be employed in netting. These small boats are now under construction in local yards, while the building of the tankers and trawlers is reported to be under negotiation with domestic ship builders. In the present circumstances, however, when many Japanese yards, except the Kawasaki Dock, Kobe, are well occupied by new ship-building, and there is hardly any capacity available for building these vessels, it is believed that their construction will be undertaken by the Kansai yard.

CHINESE GUNBOAT LAUNCHED.—The launching of the gunboat Yung Sui, constructed at the Kiangnan Dockyards to the order of the Chinese Navy, for service in the Upper Yangtze, took place recently.

NEW VESSELS FOR THE YANGTZE SERVICE.—The newest ship of the Yangtze Rapid Steamship Company, the *I'tu* slid down the ways at the Huh Hsing yard on the Nantao Bund and will shortly be placed in commission on the usual up-river run by her owners.

The new addition to the Yangtze Rapid line is the largest of the fleet and embodies many new features not heretofore found in river boats. She is driven by two Benz full Diesel motors supplied through Messrs. Jebsen & Co. and is capable of 1,050 horsepower, which will drive her at an estimated speed of 14 knots.

New N. Y. K. Vessel.—The Kiangnan Dock and Engineering Works launched a twin screw steamer built to the order of the Nisshin Kisen Kaisha for their Ichang-Chungking service. The vessel is for all the year round service, 153-ft., by 29-ft. beam by 8-ft. 6-in. deep to main deck, draft 6-ft. 6-in. fully loaded, to carry passengers, general cargo and a certain quantity of wood oil in deep tank. The upper deck is arranged for 1st and 2nd class Chinese passengers, and officers and foreign passengers are accommodated on the bridge deck. Arrangements have also been made to accommodate a certain number of third class Chinese on the main deck, when this space is not being used for cargo.

The propelling machinery consists of twin triple expansion engines developing about 2,200 indicated horsepower constructed at the works, with two Thornycroft water tube boilers, which will drive the ship at a speed of about 14 knots loaded.

This vessel is a sister ship of the well-known steamers *I'Ling* and *I'Ping*, previously constructed by the Kiangnan Dock, which have proved themselves very successful ships.

NEW GUNBOATS FOR CHINA ARE LAUNCHED.—Three river gun-boats, *Poh Hsien*, *Fv.-Yen* and *Chia-Lu*, of Kiangsu province were launched to-day at the Kiangnan dockyards. The gun-boat, *Cheng-Chi*, which was launched last year, and the three vessel launched lately were built by the Kiangnan dockyards for a sum of $240,000 from the Kiangsu province treasury.

THE *SAN LUIS MARU*.—The 10,300 ton Japanese-built *San Luis Maru*, a sister vessel to the *San Diego Maru*, already completed, has been launched. She is 430-ft. in length, having a beam of 57-ft. and a depth of 34-ft. 5-in., and was built by the Mitsubishi Zosen Kaisha to the order of the Mitsubishi Trading Co. A six-cylinder Sulzer-type engine constructed by the hull builders is installed, developing 2,250 b.h.p. at 110 r.p.m. and having cylinders 600 mm. bore with a piston stroke of 1,060 mm.

THE *SHUNTEN MARU*.—To the order of the Yamamoto Shoji K.K., the motor vessel *Shunten Maru* has now been completed. Of 9,000 tons deadweight, this ship has a length of 405-ft., a beam of 55-ft. and a depth of 32-ft. A six-cylinder Sulzer-type engine, constructed in Japan under licence by the Mitsubishi Dockyard Co., is installed, developing 2,250 b.h.p. at 110 r.p.m. and having cylinders 600 mm. bore, with a piston stroke of 1,060 mm. The *Shunten Maru*, which was built at the Mitsubishi Dockyard, will maintain a sea speed when fully laden of 13¼ knots.

A SMALL JAPANESE TANKER.—The small Japanese tanker *Midori Maru* has been launched from the Mitsubishi Zosen Kaisha's yard for the Osaka Shosen Kaisha, a firm which has five larger motor vessels on order and several in service. She is equipped with two engines with four cylinders 420 mm. in diameter and having a piston stroke of 620 mm.; the total power is 1,200 h.p. The gross tonnage is 1,700 and the deadweight capacity 2,500 tons. The length is 243-ft., the beam 38-ft. and the depth 19-ft. 5-in. The order for this vessel has not previously been announced.

THE *SAN DIEGO MARU*.—Some time ago the motor ship *San Diego Maru* was completed for the Mitsubishi Trading Co., at the Mitsubishi Dockyard. She is a vessel of 10,300 tons deadweight, and is 430 ft. long, having a beam of 57-ft. and a depth of 34-ft. 5-ins. A six-cylinder Sulzer-type engine constructed by the builders of the hull is installed, having cylinders 600 mm. bore and a piston stroke of 1,060 mm. It develops 2,250 b.h.p. at 110 r.p.m.

ROADS

NEW KAIFENG ROADS COMPLETED.—The motor roads connecting Kaifeng with Taian have been completed. The highway bureau which placed some time ago an order for 20 omnibuses in America.

NEW MOTOR ROAD IN HONAN.—The motor road between Shenchow and Tungkwan has been completed. The road is about sixty miles long and has cost the provincial treasury some $200,000. About 7,000 soldiers and civilians were employed on the work, which took less than three months. With the completion of the road it is possible to make the trip between Shenchow and Sianfu, provincial capital of Shensi, by bus in ten hours.

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MINES AND MINERALS

SOCIETE MINIERE ET METALLURGIQUE DE L'OCEANIE.—This company has been floated with a capital of 2,000,000 frs. to acquire and turn to account mines and mining concessions, with particular reference to properties situated in New Caledonia.

COMPAGNIE GENERALE DES MINES DE THAKHET.—This company has been registered with a capital of 11,000,000 frs. to develop mining concessions in the Thakhet-Savannakhet region, in the Laos, and elsewhere in Indo-China.

GAS

GAS SUPPLY FOR CANTON.—The Canton Municipal Council has under consideration the question of introducing a gas service for both illuminating and heating purposes. This matter has been receiving attention for some time, says the "*Canton Gazette*," the advocates for such a service pointing out that all large cities possess this modern utility, and that a gas supply will be a great convenience.

This gas service, if installed, will not supplant the electric service, but will supplement it, there being room for both services. Gas can be used for both illumination and heating purposes, and in the latter direction offers great convenience and many advantages over the use of firewood. Canton at present is entirely dependent on firewood for cooking purposes, and supplies are dependent directly on the state of the three rivers of the province. In the dry season, when the low levels of the rivers render navigation a matter of great difficulty, supplies of firewood to Canton are seriously curtailed, and prices soar upwards, inflicting much hardship on the poorer classes. It may well be that in the course of time the use of gas by all sections of the community, except the floating population, will supplant the place of firewood for domestic purposes.

NEW BUILDINGS

NEW NANKING STRUCTURE.—A $300,000, Administrative Building is to be erected on the main thoroughfare of Nanking, near the San Pai Lou, for the Tientsin-Pukow Railway Authorities, it was learned to-day. Work will be begun in the immediate future and it is expected that the building will be ready for occupation by September next. The plans have been prepared by Mr. Robert Fan, Shanghai architect; the building will be of reinforced concrete, three storeys high, with every modern convenience, including a big vault.

It is stated that the Ministry of Railways will temporarily occupy the greater part of the new structure, until the plans for laying out Nanking as a modern city are more fully developed, when the Ministry itself will erect a permanent and more spacious building for its own use.

WATERWORKS, AND SEWERS

NEW WATERWORKS, TOKYO SUBURB.—The Aratama waterworks, which has been under construction since April, 1928, has been completed. The waterworks will supply to 600,000 persons of 13 towns and villages in Kitatoyoshima and Toyotama, north and northeastern suburbs of Tokyo. The gross amount of the works expenditures is estimated at no less than Y.21,600,000.

PENANG'S WATER SUPPLY.—An important stage in the new Batu Ferringhi water scheme was reached when roughly 1,920 yards of tunnelling between Sungei Tengah and Sungei Kechil Valleys were completed. The boring in the initial stages was slow, but latterly the work has been expedited by large gangs working day and night. Already a certain amount of water is available from the new scheme, which will be completed in May of next year.

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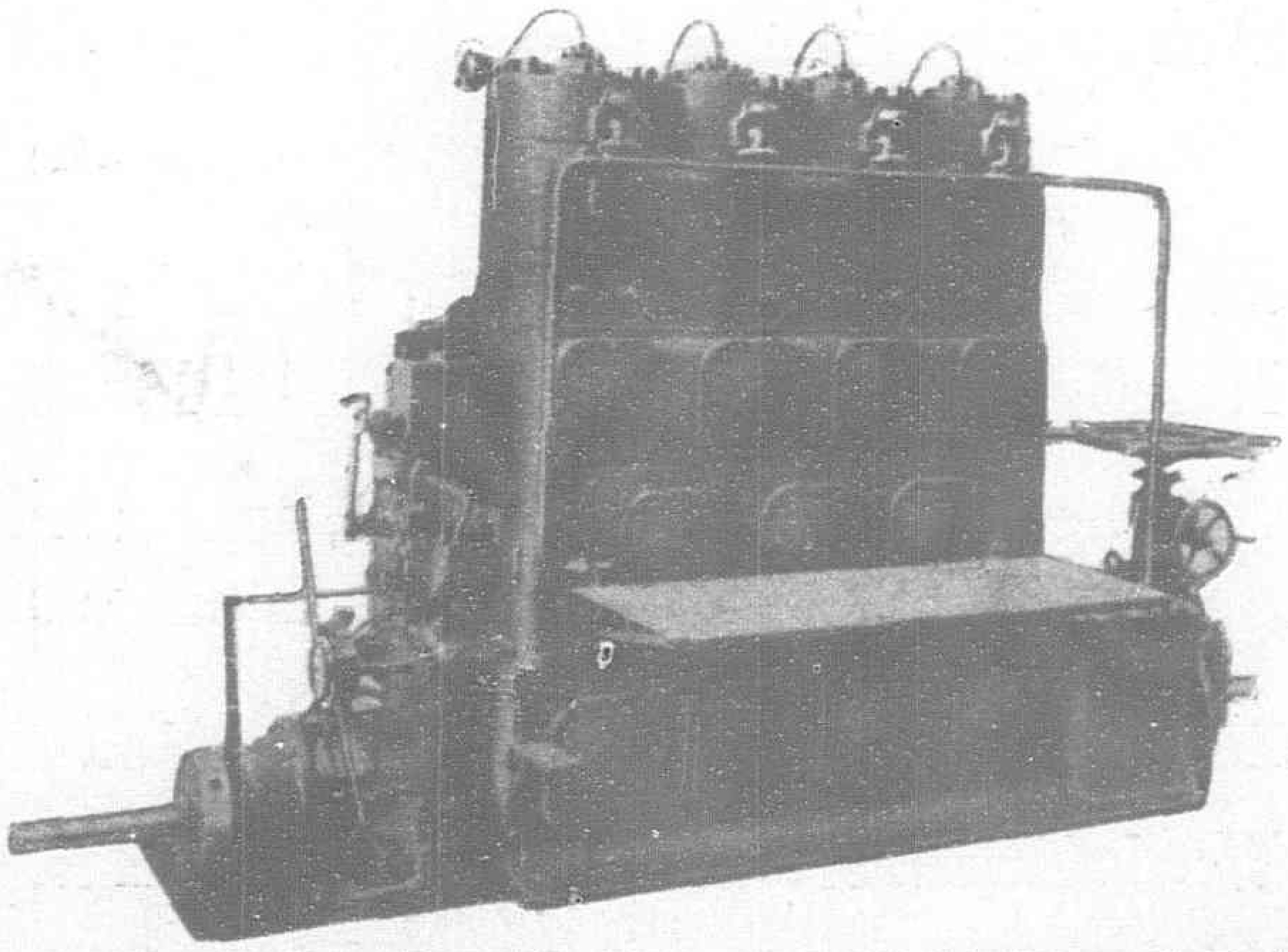

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